ASM REVIEW OF METAL LITERATURE 1947

REVIEW OF METAL LITERATURE

An Annotated Survey of Articles and Technical Papers Appearing in the Engineering, Scientific and Industrial Journals and Books, Here and Abroad, Received in the Library of Battelle Memorial Institute, Columbus, Ohio.

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PREFACE

The A.S.M. Review of Current Metal Literature is a monthly feature of *Metals Review*, published by the American Society for Metals and distributed to its members. The present volume is a collection of the installments published in *Metals Review* from February 1947 through January 1948, and represents a complete survey of the metallurgical literature published during the period January through December 1947. It is the fourth volume in a series that began in 1944.

This volume, which contains 8299 annotations, represents a considerable expansion over the preceding volumes, which averaged 5000 to 5500 annotations. This expansion can be largely attributed to the greater availability of foreign publications and the constant expansion of the Battelle library subscription list.

The annotations are not intended to serve as a substitute for a reading of the articles listed. They are brief abstracts designed to indicate the scope and content of the article so that the reader may determine whether it is something he wants to read in its entirety.

Attention is called to the table of contents immediately following and to the subject index starting on page 656. The table of contents lists the various subdivisions and classifications with explanatory notes on each; this classification is arranged primarily by processes. The subject index has been prepared with the emphasis primarily on materials, although processes are likewise indexed in detail in this section of the book. Subheads and cross-references are included in sufficient detail to permit the location of articles on any specific subject related to the metal indus-

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try. Indexing is based on the content of the article and not merely on the title.

In using the book, if the primary interest is in the broad field of corrosion, or foundry practice, or welding, turn immediately to the respective section as given in the table of contents. If the main interest is in aluminum alloys, or copper, or cast iron, turn to the corresponding heading in the subject index. If interest lies in specific aspects of corrosion, or a particular type of welding, these broad processes will be found broken down and subdivided in the subject index. An author index is also provided and a list of addresses of the journals and periodicals.

The actual preparation of the annotations has been under the capable direction of Ralph H. Hopp, technical librarian, and W. W. Howell, technical abstractor at Battelle Memorial Institute. To these men belongs the credit for the thoroughness of the metallurgical coverage, and for the skilled selection of pertinent points to be included in these brief annotations. Likewise, their advice and suggestions as to scope, classification and other matters of organization have been invaluable.

Proofreading, checking for accuracy, and other details of preparing the material for printing have been handled with painstaking thoroughness and ability by Helen Lawton of the A.S.M. staff.

MARJORIE R. HYSLOP
Editor of METALS REVIEW *and of the A.S.M. Review of Metal Literature*

May 1, 1948

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SECTION I

ORES & RAW MATERIALS

Production; Beneficiation

1-1. Good Sinter and Its Production. T. W. Plante. *Blast Furnace and Steel Plant,* v. 34, Dec. 1946, p. 1515-1519.

Tests made by Jones & Laughlin on a number of sinters. These show reducibility of particle size, raw concentrate, and of sinters made from various starting materials and at different temperatures. Important points pertinent to production of good sinter. (To be continued.)

1-2. Chelate-Forming Organic Compounds as Flotation Reagents. G. Gutzeit. *Mining Technology,* v. 10, Nov. 1946, T.P. 2077, 15 p.

Reviews the chemistry of these compounds and gives results of a number of flotation tests on miscellaneous ores using them. Certain structural features, such as the presence of "solubilizing" groups, are necessary for an effective gangue mineral depressant. Advances theory that many collectors form insoluble chelates with metallic ions at the surface of floatable minerals. Appendix analyzes structural features imparting water affinity to metal-organic compounds 46 ref.

1-3. The Submergence Factor in the Impeller Type of Flotation Machine. A. W. Fahrenwald. *Mining Technology,* v. 10, Nov. 1946, T.P. 2080, 8 p.

Results of experiments in which aeration, power, and impeller submergence are the related factors. To determine the relationship of these factors to metallurgical results, a special machine was built in which submergence was varied while other factors were held constant. In it, synthetic magnesite-quartz samples were floated.

1-4. Use of a Conductivity Cell for Flotation Reagent Control. J. F. Myers and F. M. Lewis. *Mining Technology,* v. 10, Nov. 1946, T.P. 2083, 4 p.

In the flotation of Tennessee Copper Co. sulphide ores, a variable quantity of unstable soluble salts, formed by oxidation, is present. The quantity of xanthate reagent must be varied in accordance with the quantity of these salts present. They can be readily determined by iodine titration. The human element has been eliminated by use of a conductivity cell and a recorder, since it was found that conductivity is essentially inversely proportional to soluble salt concentration.

1-5. Selective Media Concentration—a New Tool for the Mining Industry. Harry L. McNeill. *Mining Technology,* v. 10, Nov. 1946, T.P. 2084, 6 p.

Cut-away prints show the operation of the "selective-media" concentrator developed by Cleveland Cliffs Iron Co. and used for treatment of −⅜-in. ore at Calumet, Minn.; +⅜-in. ore is treated by the heavy density (ferrosilicon) process. The "selective-media" process requires no other media than a fraction of the ore itself. Machines produced 200,000 long wet tons of concentrates during the 1945 season. Table shows screen and chemical analyses of feed and products.

1-6. Influence of pH and the Crystalline Lattice Structure on the Action of Oxidizing Agents During Flotation of Minerals. I. N. Plaksine. *Reports of the Academy of Sciences of U.S.S.R.,* v. 54, no. 1, 1946, p. 47-48. (In Russian.)

Variation of flotability of sulphide minerals such as chalcopyrite, bornite, pyrite, galenite in lime media at pH's from 7.1 to 11.3.

1-7. Ore Treatment by Heavy-Media Separation. *Engineer,* v. 182, Dec. 6, 1946, p. 523-524.

Operation of the laboratory and the commercial continuous separation units developed by American Zinc, Lead and Smelting Co.

1-8. Development of a Hydrochloric Acid Process for the Production of Alu-

mina From Clay. James I. Hoffman, Robert T. Leslie, Harold J. Caul, Lewis Jesse Clark, and John Drake Hoffman. *Journal of Research of the National Bureau of Standards,* v. 37, Dec. 1946, p. 409-428

Process development and pilot plant construction. Process consists in roasting, digesting with dilute HCl, filtering, concentrating, precipitating the aluminum as a hydrated chloride by adding HCl gas, removing and washing the crystals, calcining to obtain alumina, and recovering HCl from the waste products. Pilot plant results show that the process is feasible but that costs are higher than present processes for production from bauxite.

1-9. Contributed Discussion on Cyanide and Regeneration Plant and Practice at Flin Flon. *Canadian Institute of Mining and Metallurgy Transactions,* v. 49, Dec. 1946, p. 604-606.

A complete description of the subsieve sizing apparatus mentioned in the paper printed in an earlier issue (v. 49, p. 130).

1-10. O'okiep—An Integrated Copper Mining Enterprise. M. D. Banghart and E N. Pennebaker. *Engineering and Mining Journal,* v. 148, Jan. 1947, p. 79-83.

Mining and concentration practice at South Africa mine.

1-11. Making Tin Flotation Work—No. 3. Colquiri Ore. Part II. A. M. Gaudin and R. Schuhmann, Jr. *Engineering and Mining Journal,* v. 148, Jan. 1947, p. 84-87.

Experimental work on this Bolivian ore has resulted in development of an all-flotation process for concentrating cassiterite. This process includes water recovery, treatment, and re-use. With respect to nonsulphide mineral flotation, results indicate that selective flotation, rather than bulk flotation, can soon be applied.

1-12. A Process for Cleaning Molybdenite Concentrate. F. K. McKean. *Canadian Institute of Mining and Metallurgy Transactions,* v. 50, Jan. 1947, p. 36-48.

Trouble is often encountered in flotation of molybdenite, especially when the ore contains copper, bismuth, or antimony. Concentrate should contain less than 0.5% of these metals and over 90% MoS_2. A new process and flow sheet and description of the mill in Quebec where it is in operation. Essential feature is a heat treating or mild roasting step between two flotation steps. Possible application to other similar ores.

1-13. Classification at the Sullivan Concentrator. G. J. Knighton and W. Holdsworth. *Western Miner,* v. 20, Jan. 1947, p. 39-43.

This concentrator treats a complex lead-zinc-iron ore to make a lead and a zinc concentrate. Ore body consists typically of banded sulphides, mainly galena, sphalerite, pyrrhotite and pyrite. Gives flow sheets, descriptions of equipment, and results.

1-14. Principles of Flotation—Flotation of Cassiterite and Associated Minerals. H. F. A. Hergot, J. Rogers and K. L. Sutherland. *Mining Technology,* v. 11, Jan. 1947, T.P. 2081, 18 p.

Use of sulphated and sulphonated paraffin chain compounds for cassiterite flotation was studied using the captive-bubble technique. From these data, the separation and concentration of tin was investigated by flotation tests in a 2000-g. Denver cell.

1-15. Principles of Flotation—Activation of Minerals and Adsorption of Collectors. J. Rogers and K. L. Sutherland. *Mining Technology,* v. 11, Jan. 1947, T.P. 2082, 17 p.

Relationships between collector and mineral; activator and mineral; and activator, collector, and mineral. Current theories of flotation criticized. Authors accept theories of Work and Cox and reject those of Taggart and coworkers. Summary of "principles" for determining value of a reagent as an activator or depressant. 31 ref.

1-16. Utvinning av Mineralprodukter ur Avfall Fran Järnmalmsanrikningsverk Genom Flotation. (Recovery of Oxide Mineral Products From Mill Tailings by Means of Flotation.) G. G. Bring. *Jernkontorets Annaler,* v. 130, no. 11, p 605-648.

Selective flotation for recovery of apatite, hematite, mica and lime from tailings from magnetic concentration of iron ore, using oleic acid and soaps as collectors. Experimental work presented in tables and charts.

1-17. The Development of Metallurgical Practice for the Treatment of Nchanga Mixed Oxide-Sulphide Ores. H. L. Talbot. *Bulletin of the Institution of Mining and Metallurgy,* Jan. 1947, p. 1-29.

Development of a crushing, grinding, classifying, and flotation flow sheet for a complex copper ore.

1-18. Lamp Filament to Atomic Pile. *Chemical and Engineering News,* v. 25, Jan. 27, 1947, p. 236.

Westinghouse development of commercial production of uranium, zirconium, and thorium.

1-19. Crushing and Grinding. Lincoln T Work. *Industrial and Engineering Chemistry,* v. 39, Jan. 1947, p. 11, 31.

Recent developments. 26 ref.

1-20. Flotation. Fred D. DeVaney. *Industrial and Engineering Chemistry,* v. 39, Jan. 1947, p. 26-27.

A survey of recent developments. 28 ref.

1-21. Short History of Progress Used to Date on Intermediate Ores. Peter Warhol, A. E. Matson and Louis J. Erck.

Skillings' Mining Review, v. 35, Feb. 1, 1947, p. 1-2, 6, 15.

Progress in beneficiation of iron ores in Minnesota. Installations and types of ores and concentration problems to be solved.

1-22. Pilot-Plant Production of High-Grade Magnetite Concentrates, Cranberry, N. C. Frank D. Lamb and D. A. Woodard. *Bureau of Mines Report of Investigations* 3980, Dec. 1946, 7 p.

Work was initiated to provide a source of high-grade iron ore for experimental sponge iron production. Concentrates assaying 70.3% Fe were obtained by grinding to −65 mesh, followed by magnetic separation. Proposed flow sheet and cost estimates.

1-23. Mineral-Dressing Characteristics of the Red Iron Ores of Birmingham, Ala. Will H. Coghill and G. Dale Coe. *Bureau of Mines Bulletin* 464, 1946, 99 p.

Geography and geology; a historical review of mining, smelting and milling; the present status of the industry; the most recent, hitherto unpublished work of the Southern Experiment Station of the Bureau, on the beneficiation and appraisal of ores and iron-bearing strata of Red Mountain.

1-24. The Principles Underlying the Sintering of Iron Ores. R. Hay and J. M. McLeod. *Journal of the West of Scotland Iron & Steel Institute*, v. 52, Session 1944-45, p. 109-121.

An extension was made of the mechanism of formation, the micro and macrostructure, composition, and reducibility of various classes of sinters in order to help solve the problem of production of a sinter as reducible as natural ore yet of sufficient strength for good gas permeability. The laboratory experiments show that great improvement in present sintering technique is possible. 17 ref.

1-25. Iron Ore Beneficiation in Germany. *Iron Age*, v. 159, Feb. 6, 1947, p. 57.

Iron ore beneficiation plants supplying the Hermann Göring works, at Salzgitter, in Southwest Germany, together with information regarding ore supplies for these works taken from recent report by a metallurgical team prepared by the C.I.O.S.

1-26. Solution of Cassiterite in Alkaline Solutions. V. G. Tronev and A. L. Chrenova. *Reports of the Academy of Sciences of U.S.S.R.*, v. 54, no. 7, 1946, p. 615-617. (In Russian.)

Artificially prepared tin oxide was successfully dissolved in alkaline solution in an autoclave at 200 to 300° C., although the literature reports no success in attempts to dissolve cassiterite. Results may have application to recovery of tin from ore.

1-27. Research in Flotation. Arthur F. Taggart. *American Scientist*, v. 35, Jan. 1947, p. 85-94.

The development of flotation techniques. Importance of the development of techniques for analysis of dilute solutions and for detection of contaminants by contact-angle measurement. 11 ref.

1-28. Ore Concentration and Milling. E. H. Rose. *Mining and Metallurgy*, v. 28, Feb. 1947, p. 67-72.

1946 developments. Greater utilization of gravity methods for finer sizes seen in current practice.

1-29. Research Widens Field for Iron-Ore Beneficiation. Grover J. Holt. *Engineering and Mining Journal*, v. 148, Feb. 1947, p. 108-111.

1946 developments.

1-30. Concrete Flotation Cells Replace Wooden Ones. *Engineering and Mining Journal*, v. 148, Feb. 1947, p. 122.

Construction of cells built because of timber shortage for use in mill of McIntyre-Porcupine Mines, Ltd., Schumacher, Ont.

1-31. The Roasting Plant, Que Que, Southern Rhodesia, Africa. T. S. Cleary. *Deco Trefoil*, v. 11, Jan-Feb. 1947, p. 5-12.

Details of gold-concentrate treating plant, including roasting, concentration, amalgamation, grinding, cyanidation. Pictures, flow sheets and table.

1-32. Successful Tailing Reclamation. *Mining World*, v. 9, Feb. 1947, p. 29-32.

Flotation and heavy media processes for recovery of lead and zinc from old jig tailings in Coeur d'Alene section of Idaho.

1-33. The Dressing of Iron Ores. F. B. Michell. *Mine & Quarry Engineering*, v 13, Feb. 1947, p. 45-53.

Types of ore and methods of treatment. Illustrated by examples from practice involving different types of flow sheet. 12 ref.

1-34. Washing Plant for Total Run of Mine Ore at Rand Leases (Vogelstruisfontein) Gold Mining Company, Limited. M J. Dennery and F. Wartenweiler. *Journal of the Chemical, Metallurgical and Mining Society of South Africa*, v. 47, Oct. 1946. p. 147-150; discussion, p. 150-153.

Flow sheet and operating data.

1-35. Engineering Problems in the Preparation of Ores for Blast Furnaces. D. C. Hendry. *Journal of the Iron and Steel Institute*, v. 155, Jan. 1947, p. 121-135.

Difficulties encountered in the crushing, screening, and blending of ores for the blast furnace, with particular reference to certain English ores; types of equipment in use for these operations; advantages and disadvantages of each type and precautions necessary to insure smooth operation. Normal sinter plant layout and equipment discussed critically. Ore preparation plant of the Hütte Braunschweig, Germany.

1-36. The Latest Development in Ore Dressing. S. R. Zimmerley. *Mining Congress Journal,* v. 33, Feb. 1947, p. 39-42.

New methods of concentration applied to low-grade materials and heavy media methods; Humphreys' spiral classifier; selective media concentrator; hydraulic constriction plate-type classifier; automatic controls for grinding and classification; Knoop hardness tester for small sizes; improved separation in flotation induced by heating; dry concentration by preferential attrition grinding and air classification; new uses of SO_2 for metallurgical purposes; ion-exchange resins for recovery of metals from solutions.

1-37. The Coal Field and Iron Deposits of Mexico. *Inter-American Development Commission.* 29 p.

Summary of these deposits insofar as they have been mapped.

1-38. Direct Reduction of Oxide and Silicon Dioxide Nickel-Cobalt Ores. D. P. Bogatsky. *Bulletin of the Academy of Sciences of U.S.S.R.,* Section of Technical Sciences, no. 12, 1946, p. 1809-1822. (In Russian.)

Contrary to established opinion, it is shown that low-grade and tailings-dump oxide and silicon dioxide nickel-cobalt ores may be treated by a new method of direct induction. The method and results of its application.

1-39. Making Tin Flotation Work—No. 4, San Jose Ore. A. M. Gaudin and R. T. Hukki. *Engineering and Mining Journal,* v. 148, March 1947, p. 70-72.

Results of a laboratory investigation which resulted in development of a proposed flow sheet for ore containing 1.39% Sn, 6.1 oz. Ag; 23.6% Fe; and 31.5% silica.

1-40. Beneficiation of New England Beryllium Ores. Frank D. Lamb. *Bureau of Mines Report of Investigations 4040.* March 1947, 9 p.

Three beryl-bearing ores from the New England States were tested. The ores were found amenable to flotation only after desliming and vigorous surface conditioning with a suitable agent, such as caustic soda, trisodium phosphate, or hydrofluoric acid. Fatty acids emulsified with Emulsol X-1 were found to be the most satisfactory promoting agents.

1-41. The H.H. Sink and Float Process of Mineral Separation. H. W. Halton. *Western Miner,* v. 20, March 1947, p. 52, 54.

Process uses a stable suspension of fine solids in water as the separating medium. Criteria of suitability of the process for different ores.

1-42. Crushing and Grinding Efficiencies. S. R. Rabson. *Journal of the Chemical, Metallurgical and Mining Society of South Africa,* v. 47, Dec. 1946, p. 235-237.

Discussion of paper by T. K. Prentice in Jan-Feb. 1946 issue.

1-43. En ny Flotationsapparat för Laboratorieändamal. (A New Flotation Apparatus for Laboratory Use.) T. Mörtsell. *Jernkontorets Annaler,* v. 131, no. 1, 1947, p. 26-28.

A new unit claimed to be highly efficient; comparative results supporting this claim.

1-44. The Treatment of Gold Ore Containing Pyrrhotite at the Sub Nigel, Ltd. A. King, A. Clemes and H. E. Cross. *Bulletin of the Institution of Mining and Metallurgy,* March 1947, p. 25-33.

Difficulties which arose in cyanide treatment of the above ore and results of investigations and steps taken to overcome the difficulties.

1-45. Metallurgical Efficiency—a Yardstick in Lead-Zinc Flotation Metallurgy. R. A. Pallanch. *Mining Technology,* v. 11, March 1947, T. P. 2141, 5 p.

Application of a "yardstick" defined as percentage ratio of actual mill return per ton of ore to the theoretical maximum return if perfect grades and recoveries had been accomplished, at the Midvale, Utah, mill of U. S. Smelting and Mining Co. Sample calculations for an ore from which four different metals are recovered.

1-46. Crushing Practice at the Braden Copper Co. E. R. Johnson. *Mining Technology,* v. 11, March 1947, T. P. 2150, 7 p.

Numerous improvements made in the crushing section of a large copper flotation concentrator in Chile during the past 15 years to increase the efficiency and to raise daily output from around 20,000 to 30,000 tons.

1-47. Tailings and Mine-Dump Reclamation in the Coeur d'Alenes During World War II. W. L. Zeigler. *Mining Technology,* v. 11, March 1947, T. P. 2145, 10 p.

Methods used for recovery of lead and zinc concentrates.

1-48. Roasting and Flotation Practice in the Lake Shore Mines Sulphide Treatment Plant. J. E. Williamson, A. L. Blomfield and B. S. Crocker. *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 50, 1947, p. 138-200. (Bound with *Canadian Mining and Metallurgical Bulletin,* March 1947.)

Extensive description of Canadian gold recovery plant. The introduction describes the distribution of values in the ore, and the reasons for deciding upon certain equipment, procedures, and sequences in the treating plant. Part I gives a detailed description of the flotation plant; Part II, the roasting plant; and Part III, the cyanidation plant. The appendix describes assay and other laboratory techniques,

and gives information concerning costs. 13 ref.

1-49. An Occurrence of Submicroscopic Gold in the Dolphin East Lode, Fiji. F. L. Stillwell and A. B. Edwards. *Australasian Institute of Mining & Metallurgy Proceedings,* March 31, 1946, p. 31-46.

Micrographs of pyrite and arsenopyrite ores containing "invisible gold" in amounts of 25 to 35 oz. per ton; the ore is described.

1-50. Arizona's Mardun Uses Dry Concentration. *Mining World,* v. 9, April 1947, p. 27-28.

Mining and beneficiation of copper deposit which consists of minus 200-mesh carbonates occurring as a coating and cementing material between the grains of sandstone. The rock is crushed and ground to liberate the constituents, which are then separated in a special air separator. The liberation is accomplished with very little reduction in size of the sand grains.

1-51. Remote Control a Feature of Ore-Conditioning Plant. A. A. Nilsen and Roy Yingling. *Engineering and Mining Journal,* v. 148, April 1947, p. 74-79.

Large central plant of Tennessee Coal, Iron & Railroad Co., in the Birmingham district, prepares ores from its different mines for its furnaces by crushing, screening, and blending. Withdrawal of ore from 40 800-ton storage silos is directed from a control room. Three sintering machines handle the fines. Many other features.

1-52. Some Geology and Mineralogy of the Indin Lake Area, N. W. T. E. O. Lilge. *Western Miner,* v. 20, April 1947, p. 52-59.

Some data from ore-dressing investigations involving flotation and cyanidation of gold ore from the above area.

1-53. Extraction of Selenium From Ores. I. N. Plaksin, N. A. Suvorovskaia, and A. V. Astafiena. *Journal of Applied Chemistry (U.S.S.R.),* v. 19, no. 7, 1946, p. 668-672. (In Russian.)

The nature of the detrimental effect of selenium upon the cyanidation of gold-bearing selenious ores. Treatment with chloride of lime eliminates the difficulty and also facilitates the separation of selenium from the ores. A flow sheet is proposed.

1-54. The Physico-Chemical Bases for the Hydrometallurgical Concentration of Lead. B. V. Gromov. *Journal of Applied Chemistry (U.S.S.R.),* v. 19, no. 8, 1946, p. 810-819. (In Russian.)

Experiments indicate the feasibility of improving the hydrometallurgical recovery of lead from ores, concentrates, and other materials. 14 ref.

1-55. Chlorination of Tungsten Ores With Liquid Sulphur Chlorides. J. D. Fridman and U. Bogaraz. *Journal of Applied Chemistry (U.S.S.R.),* v. 19, no. 8, 1946, p. 833-840. (In Russian.)

A low-temperature method for recovery of tungsten from its ores. Factors affecting yields, such as chlorine content of the chlorination agent, ore composition, and others. 12 ref.

1-56. Concentration of Ores by Heavy Media. F. T. C. Doughty. *Mine & Quarry Engineering,* v. 13, April 1947, p. 101-107.

Development of heavy-media processes; details of a typical flow sheet, including both theoretical and practical aspects.

1-57. Gold Mining in South India. R. N. Pryor. *Mine & Quarry Engineering,* v. 13, April 1947, p. 111-116.

Present practice and technique. Concentration flow sheet and methods.

1-58. Natural Acidity and Copper Precipitation. Frank Cloke. *Mining Magazine,* v. 76, April 1947, p. 211-212.

Two instances in which insufficient knowledge of the affect of natural acidity on copper precipitation resulted in considerable losses in metallic copper values in copper leaching operations.

1-59. Cassiterite Flotation. (Concluded.) *Mining Magazine,* v. 76, April 1947, p. 247-248.

Use of sulphated and sulphonated paraffin-chain compounds for separation of cassiterite from a Tasmanian quartz ore and from muscovite and wolframite.

1-60. Wartime Treatment of the Lead-Zinc Dumps Situated at Nenthead, Cumberland. E. W. O. Dawson. *Bulletin of the Institution of Mining and Metallurgy,* April 1947, p. 15-24.

The test program and the development of a satisfactory mill circuit.

1-61. Milling on a Shoestring on the African Gold Coast. W. H. Dennis. *Engineering and Mining Journal,* v. 148, May 1947, p. 76-77.

Amalgamation and cyanidation procedures at a Gold Coast mine. Cyanide plant flow sheet.

1-62. Factors in Relative Wear of Grinding Ball Sizes. O. E. B. Timmermans. *Engineering and Mining Journal,* v. 148, May 1947, p. 78-79.

Three tests on balls for a ball mill; effects of variations in feed size, variations in proportion of large to small balls, and using a larger mill.

1-63. Recovery of Copper by Leaching. W. H. Dennis. *Mine & Quarry Engineering,* v. 13, May 1947, p. 140-146.

Dissolving the copper; three principal leaching methods—heap leaching; leaching in tanks and the agitation method; ammonia leaching.

1-64. Beneficiation of Western Beryl Ores. H. D. Snedden and H. L. Gibbs. *Bureau of Mines Report of Investigations 4071,* May 1947, 18 p.

Procedures for preparing commercial-grade concentrates of beryl from pegmatite ores. The ores that were beneficiated ranged from 0.94% BeO to only 0.08% BeO; they were from different localities and varied in physical character, indicating that the procedures are flexible and probably adaptable to other ores. Techniques used were grinding, sink-and-float-separation, tabling, and flotation. Also a reliable method for the determination of beryllium in the ores.

1-65. The Saga of Red Mountain Iron. A. A. Nilsen and Roy Yingling. *Mining Congress Journal,* v. 33, May 1947, p. 28-33.

Mining and ore beneficiation practice of Tennessee Coal, Iron and Railroad Co. near Birmingham, Ala.

1-66. Production of Alumina by the Lime Soda Process. Part IV. W. E. Prytherch, M. L. R. Harkness, and W. D. Spencer. *Chemical Age,* v. 56, May 10, 1947, p. 607-613.

Results of British work on the extraction of alumina from shale. (To be continued.)

1-67. Scientists Fight to Save an Iron Empire. *Science Illustrated,* v. 2, June 1947, p. 36-41, 64.

Research on beneficiation of Mesaba taconite.

1-68. The Chemical News Parade. Aluminum From Clay. *Chemical and Engineering News,* v. 25, June 2, 1947, p. 1590-1591.

Picture story of the hydrochloric-acid extraction process, which has been developed to the pilot-plant stage. Flow diagrams.

1-69. Gold Recovery at Croesus Proprietary Treatment Plant. K. L. Brinsden. *Mines Magazine,* v. 37, April 1947, p. 15-18, 24.

Character of the ore, milling, concentration, roasting, refining, and costs. Flow diagrams for this Australian plant.

1-70. The Treatment of Gold Ore Containing Pyrrhotite at the Sub Nigel, Ltd. Andrew King, A. Clemes and H. E. Cross. *Journal of the Chemical, Metallurgical and Mining Society,* v. 47, Feb. 1947, p. 291-297; discussion, p. 297-300.

Certain difficulties which arose in the cyanide treatment of ore; results of investigations and steps found necessary to overcome these difficulties.

1-71. Symposium on Milling Devices and Practices. J. F. Myers and R. J. Tower. *Mining Technology,* v. 11, May 1947, T. P. 2162, 15 p.

Equipment, auxiliary apparatus, and concentration practice in a variety of mills throughout the country.

1-72. Comparison of Galena and Ferrosilicon in Heavy-Media Separation. E. H. Crabtree, Jr. *Mining Technology,* v. 11, May 1947, T. P. 2181, 5 p.

Operating results and the costs of operation of the two media. Galena concentrate was used at mill of Eagle-Picher for over two years and then replaced by minus 100-mesh ferrosilicon. Results indicate superiority of the ferrosilicon.

1-73. A New Separating Vessel for Sink-Float Concentration. E. C. Bitzer. *Mining Technology,* v. 11, May 1947, T. P. 2182, 19 p.

Three years of work on both iron ore and lead-zinc ore, on both a pilot-plant and commercial scale, resulted in improvements in both mechanical and metallurgical performance, as a result of substitution of a spiral classifier for a cone in the separating circuit of the heavy-media process. Definite advantages are indicated for concentration of any material containing large amounts of solids having a specific gravity close to that of the separating medium.

1-74. Treatment of Idaho-Wyoming Vanadiferous Shales. S. F. Ravitz, I. W. Nicholson, C. J. Chindgren, L. C. Bauerle, F. P. Williams, and M. T. Martinson. *Metals Technology,* v. 14, June 1947, T. P. 2178, 14 p.

Bureau of Mines work on two different types of vanadium-containing ores. The ore from southwestern Wyoming contains about 1% V_2O_5 and 2 to 3% P_2O_5. More than 90% can be recovered by baking with strong H_2SO_4 solution followed by leaching. The ore from southeastern Idaho contains about 1% V_2O_5 and 10% P_2O_5. Processes were worked out for three variations of this ore, using roasting and leaching. Both vanadium and phosphate can be recovered.

1-75. Rock Drill Oil May Help or Hinder Your Flotation. E. C. Herkenhoff. *Engineering and Mining Journal,* v. 148, June 1947, p. 88-90.

Experimental data show that lubricants used in drilling have either an adverse or a helpful effect on flotation.

1-76. Chromium-Iron Ratio Chart. *Engineering and Mining Journal,* v. 148, June 1947, p. 108.

Chart relates percentages of FeO and Cr_2O_3 to Cr-Fe ratio.

1-77. Vital Magnesite Mined in the State of Washington. *Link-Belt News,* v 14, June-July 1947, p. 1-3.

Ore preparation and concentration procedures. Flow sheet. Materials-handling equipment.

1-78. Beneficiation of New England Beryllium Ores. Frank D. Lamb. *Mines*

Magazine, v. 37, May 1947, p. 19-22. (Reprinted from Bureau of Mines Report of Investigations 4040.)

Method adopted and results of tests on New Hampshire, Connecticut and Maine ores.

1-79. Transport and Deposition of the Nonsulphide Vein Materials. Part II. Cassiterite. F. Gordon Smith. *Economic Geology,* v. 42, May 1947, p. 251-264.

Experiments made to determine the mechanism of formation of cassiterite. This material was prepared by means of high pressure reactions using sodium stannate, alkali, sodium fluoride, and sometimes other reagents. 30 ref.

1-80. Classification at the Sullivan Concentrator. G. J. Knighton and W. Holdsworth. *Canadian Institute of Mining and Metallurgy Transactions,* v. 50, June 1947, p. 362-374. (Bound with *Canadian Mining and Metallurgical Bulletin.*)

Treats a complex lead-zinc-iron ore to make a lead and a zinc concentrate. The ore body consists typically of banded sulphides, mainly galena, sphalerite, pyrrhotite, and pyrite. Important factors in the concentration of the ore are its exceedingly complex nature and its high specific gravity.

1-81. The Production of Molybdenite and Bismuth at La Corne, Quebec. F. K. McKean. *Canadian Institute of Mining and Metallurgy Transactions,* v. 50, June 1947, p. 375-388. (Bound with *Canadian Mining and Metallurgical Bulletin.*)

A sequel to "A Process for Cleaning Molybdenite Concentrate," published in a recent issue (p. 36-48, 1947). The work of translating laboratory experience in developing a new process for treating complex molybdenite ores (described in previous paper) into mill practice; what changes were required in design to put the scheme on an operational basis, and the improvements in mill products which resulted from the new procedure.

1-82. Mesaba Range Changes Heavy-Media Practice. E. C. Bitzer. *Mining Congress Journal,* v. 33, June 1947, p. 36-39.

Recent developments make the process considerably more attractive than it was a few years ago. Limitations as well as some possibilities for extending the usefulness of the process.

1-83. On the Geochemistry of Columbium. Kalvero Rankama. *Science,* v. 106, July 4, 1947, p. 13-15.

Results of work in Finland.

1-84. Sintering Machines for the Iron and Steel Industry. W. J. Urban. *Blast Furnace and Steel Plant,* v. 35, July 1947, p. 809-812.

Some of the equipment which has been used and present development trends.

1-85. Hydrometallurgical Treatment of Alluvial Nickel Ore by an Ammoniacal Method. D. P. Gobatsky and A. S. Semenova. *Journal of Applied Chemistry (U.S.S.R.),* v. 20, no. 1 and 2, 1947, p. 89-96. (In Russian.)

The second stage of the process, i.e., the leaching out of the reduced nickel by means of ammoniacal reagents, was investigated on a commercial scale.

1-86. The Phenomenon of Accommodation of Magnetic Permeability of Magnetite. A. M. Vinchina and others. *Journal of Technical Physics (U.S.S.R.),* v. 17, no. 2, 1947, p. 129-142. (In Russian.)

Accommodation and disaccommodation of magnetic permeability of magnetite from different deposits. The influence of temperature, magnetic field, and other factors on this phenomenon. 12 ref.

1-87. The Dressing of Tungsten Minerals. (Concluded.) F. B. Michell. *Mine & Quarry Engineering,* v. 13, July 1947, p. 204-210.

Flow sheets for scheelite ores; all-gravity flow sheets; all-gravity plants followed by roasting and magnetic separation; flow sheets embodying a combination of gravity concentration and flotation; all-flotation flow sheets; dressing of complex tungsten ores. 15 ref.

1-88. Ore Dressing Investigations. Joint Investigations of the Council for Scientific and Industrial Research and the University of Melbourne. *Metallurgical Laboratory, University of Melbourne, Melbourne, Australia, Investigation No. 294, 301, 305, 308, 309, 312, 315, 316, and 317,* Jan. 30, 1946 to Jan. 4, 1947.

Brief mimeographed reports concerning the concentration of gold ores.

1-89. Metallurgical Research Program of the Bureau of Mines Relating to the Nonferrous Metals. R. S. Dean and B. Silkes. *Bureau of Mines Report of Investigation 4064,* May 1947, 22 p.

Bureau accomplishments in recovery of nonferrous metals from their ores by ore-dressing methods, and by roasting, smelting, electrometallurgical, and other processes.

1-90. Recovery of Alumina From Kaolin by the Lime-Soda Sinter Process. Frank J. Cservenyak. *Bureau of Mines Report of Investigations 4069,* May 1947, 59 p.

Tests in this report are restricted to sintering and leaching tests on kaolin from South Carolina, where extensive deposits were found. Results from the pilot-plant tests show that 86 to 89% of the Al_2O_3 can be recovered on the basis of 1000 tons of Al_2O_3 per day. Total production cost is estimated to be \$47.96 per short ton of Al_2O_3 produced.

1-91. Sulphur Dioxide Leaching Tests on Various Western Manganese Ores. W. F. Wyman and S. F. Ravitz. *Bureau of Mines Report of Investigations 4077,* June 1947, 12 p.

Results of over 300 tests on about 80 samples from 58 deposits, made in small-scale laboratory equipment. Some were made in a batch semipilot plant on 50 to 150-lb. samples and some on a scale of several hundred pounds per day in a continuous semi-pilot plant.

1-92. Beneficiation of Chromite Ores From Western United States. J. V. Batty, T. F. Mitchell, R. Havens, and R. R. Wells. *Bureau of Mines Report of Investigations 4079,* June 1947, 26 p.

Results of laboratory ore-dressing studies of ten different chromite ores sampled by Bureau of Mines engineers.

1-93. Beneficiation of Oxide Tin Ores From the States of Zacatecas and Guanajuato, Mexico. W. G. Sandell, L. C. Bauerle, and K. C. Dean. *Bureau of Mines Report of Investigations 4080,* June 1947, 10 p.

Results of laboratory ore-dressing and sulphide volatilization studies on three samples of Mexican tin oxide ore.

1-94. On the Mineralogy of β-Alumina. D. S. Beliankin, V. V. Lapin and J. P. Simanov. *Comptes Rendus de l'Academie des Sciences de l'U.R.S.S.,* v. 55, no. 6, 1947, p. 525-533. ((In English.)

Investigation of a high-alumina slag revealed presence of three independent crystalline forms, one alpha and two beta. Constants are discussed and tabulated.

1-95. Some Studies in the System $AlCl_3$-$FeCl_3$-KCl-NaCl-HCl-H_2O at 25, 30 and 35°. Grant L. Miles. *Journal of the American Chemical Society,* v. 69, July 22, 1947, p. 1716-1719.

An investigation of a hydrochloric acid process for the extraction of alumina from calcined alunite.

1-96. Further Discussion in Johannesburg on Crushing and Grinding Efficiencies. *Bulletin of the Institution of Mining and Metallurgy,* July 1947, p. 29-43.

L. Ackerman presents an alternative theory of grinding; A. Clemes describes results of some investigation of grinding efficiencies; and S. R. Rabson contributes critical discussion. Also includes T. K. Prentice's reply.

1-97. Tubes Find Iron in Ore. *Electronics,* v. 20, Aug. 1947, p. 172.

An electronic detector scans broken ore on conveyer belts for tramp iron and trips the belt automatically, preventing damage to crushing mills.

1-98. Discussion on Engineering Problems in the Preparation of Ores for Blast Furnaces. D. C. Hendry. *Journal of the Iron and Steel Institute,* v. 156, July 1947, p. 415-420; discussion, p. 420-428.

Discussion of paper published in January issue.

1-99. Milling Practice at Aguilar. Wing L. Lew. *Mining and Metallurgy,* v. 28, Aug. 1947, p. 409-411.

Recovery of lead, silver, and zinc from mining operations in the Argentine Andes.

1-100. Milling Practice at the Balmat and Edwards Mills. Jay J. Burns. *Mining and Metallurgy,* v. 28, Aug. 1947, p. 395-397.

Zinc concentration practice at two mills operated by St. Joseph Lead Co. in St. Lawrence County, N. Y.

1-101. Milling Practices in Southeast Missouri. H. R. Stahl. *Mining and Metallurgy,* v. 28, Aug. 1947, p. 374-376.

Procedures and flowsheets for combined gravity and flotation concentration by St. Joseph Lead Co.

1-102. Crushing and Grinding Efficiencies. T. K. Prentice. *Journal of the Chemical, Metallurgical & Mining Society of South Africa,* v. 47, March 1947, p. 343-350.

Author's reply to discussions of paper in the Jan-Feb. 1946 issue.

1-103. The Cell and Symmetry of Pyrrhotite. M. J. Buerger. *American Mineralogist,* v. 32, July-Aug. 1947, p. 411-414.

New results disagree with the literature data. Single crystals of ferromagnetic pyrrhotite from Schneeberg, Saxony, and from Morro Velho, Brazil, were investigated by the procession method. The photographs show a hexagonal cell much larger than any hitherto proposed for either troilite or pyrrhotite.

1-104. The Use of Thoulet's Solution for Heavy Mineral Separation. Judith Weiss. *American Mineralogist,* v. 32, July-Aug. 1947, p. 475-478.

Procedures for preparation of solution, its use in separation, and for recovery of used solution. The solution consists of a mixture of HgI and KI in water. Advantages and disadvantages.

1-105. Effect of Oxidation on Floatability and Separation of Sulphide Minerals. I. N. Plaksin, A. I. Sinel'nikova, and G. N. Khazhimskaia. *Bulletin of the Academy of Sciences of U.S.S.R. (Section of Technical Sciences),* no. 4, 1947, p. 425-438. (In Russian.)

Effect of oxygen in selective flotation processes. Separation of sulphide bearing minerals is accelerated by aeration, particularly when the pH of the medium is between 7.0 and 11.0. Introduction of oxygen into the flota-

tion medium has a somewhat more pronounced effect than aeration.

1-106. Investigation Into the Chemical and Physical Nature of Silicated Nickel Minerals and the Process of Their Calcination and Reduction. G. G. Urazov and D. P. Bogatzky. *Comptes Rendus de l'Academie des Sciences de l'U.R.S.S.* v. 55, no 9, 1947, p. 837-839. (In English.)

An investigation of five Russian nickel silicate ores.

1-107. Particle Discrimination in Flotation. A. M. Gaudin. *Deco Trefoil,* v 11, July-Aug. 1947, p. 5-8.

Principles and applications of flotation. Eleven fundamental problems for future research. (Reprinted from *Technology Review.*)

1-108. Oxide Flotation at Darwin. *Mining World,* v. 9, Aug. 1947, p. 23-26, 70-71.

Development at Anaconda's California operation provides basis for mill expansion and adoption of alternate oxide-sulphide flowsheet.

1-109. Wartime Treatment of the Lead-Zinc Dumps Situated at Nenthead, Cumberland. E. W. O. Dawson. *Bulletin of the Institution of Mining and Metallurgy,* Aug. 1947, p. 35-43.

Discussion of a paper on possible economic and commercial importance of war treatment of lead-zinc dumps.

1-110. Mineral Contents of Bubbles During Flotation. Z. V. Volkova. *Engineers' Digest (American Edition),* v. 4, June 1947, p. 295.

New method based on time of induction, wetting characteristics of mineral surfaces, speed with which the bubble is rising and size of the bubble, ratio of the mineral to be floated to other solid contents, and size of mineral particles. Theory and experimental results for a mixture of quartz and barite. (Translated and abstracted from *Gornii Journal (U.S.S.R.),* no. 3, 1946, p. 30-35.)

1-111. Measuring Method for Magnetic Properties of Ores. V. J. Karamasin and B. J. Naygolnikov. *Engineers' Digest (American Edition),* v. 4, June 1947, p. 295-296.

Principle of the measurements consists in suspending a 1-cc. lump of ore on a thread from one arm of the beam, and balancing it by weights on the pan, before closing the circuit exciting the magnet. With crushed ore samples, same volume is included in a celluloid cube and treated like the lump. (Translated and abstracted from *Zavodskaya Laboratoriya (U.S.S.R.),* no. 7-8, 1946, p. 712-717.)

1-112. Concentration of Manganese Ores From Lincoln County, Nev. B. K. Shibler, W. W. Agey, and A. O. Ipsen. *Bureau of Mines, Report of Investigations 4111,* Aug. 1947, 19 p.

The amenability to concentration of 8 types of ores was investigated. Three samples were amenable to the production of satisfactory manganese concentrates. Two were roasted and sintered to produce Pb-Ag-Zn fumes and residues of possible value as manganiferous iron ore. One ore gave no marketable recoveries of manganese, but gave 80% recoveries of lead, silver, and zinc by bulk sulphide flotation followed by fuming of the concentrate. No satisfactory results were obtained from two of the samples.

1-113. Electrostatic Treatment of a Tantalite-Cassiterite Concentrate from Greenbushes. *Metallurgical Laboratory, University of Melbourne, Ore-Dressing Investigation no. 294,* Jan. 30, 1946, 10 p.

Electrostatic treatment of the product of magnetic separation. While a fair separation was obtained by magnetic treatment, electrostatic treatment of the products failed to make a substantial improvement in their quality.

1-114. Cyanidation of Lancefield Dump Calcines. *Metallurgical Laboratory, University of Melbourne, Ore-Dressing Investigation no. 306,* Oct. 14, 1946, 6 p.

Test results on three samples with respect to the practicability of cyanidation by flotation.

1-115. Iron Country Mine Operators Press for Maximum Tonnage. A. H. Hubbell. *Engineering and Mining Journal,* v. 148, Sept. 1947, p. 84-85.

New developments in the Lake Superior iron country.

1-116. Continuous Centrifuge in the Mineral Industry. S. C. Lyons and A. L. Johnson. *Mining Technology,* v. 2, July 1947, T. P. 2195, 11 p.

Principal types of centrifuges and their applications in the industry. Advantages and disadvantages of continuous centrifugal processes.

1-117. Milling Practices at Concentrator of Morenci Reduction Works. B. H. Cody. *Mining Technology,* v. 2, July 1947, T. P. 2194, 26 p.

Type of ore and operating data for 1942 to Sept. 1, 1946. Flow sheets for primary and secondary crushing, grinding, flotation and regrinding of concentrate, filtration of concentrate, water supply and consumption, and tailings disposal. Copper is recovered from a medium-hard monzonite porphyry in which the principal sulphide minerals are chalcocite and pyrite.

1-118. A Short-Cut Method of Metallurgical Accounting. E. H. Crabtree, Jr., and Neil S. Parker. *Mining Technology,* v. 2, July 1947, T. P. 2193, 3 p.

Calculation procedure developed for use in custom-milling plant of the Eagle-Picher Mining and Smelting Co. Special slotted sheets are used to solve the three and four-product formulas given in "Taggart's Handbook of Ore Dressing".

1-119. Milling Practice at New Lead-Zinc Concentrator of Phelps Dodge Corp. R. C. Thompson. *Mining Technology*, v 2, July 1947, T. P. 2192, 10 p.

Mill designed for all-flotation treatment of 450 tons of lead-zinc ore per day and type of ore.

1-120. Milling Lead-Zinc Ores at Iron King Mine, Prescott, Arizona. H. R. Hendricks. *Mining Technology*, v. 2, July 1947, T. P. 2191, 5 p.

Development of a satisfactory procedure with the present flow sheet and milling practice. Lead, zinc, gold, silver, and pyrite are recovered.

1-121. Standard Grindability Tests Tabulated. Fred C. Bond. *Mining Technology*, v. 2, July 1947, T. P. 2180, 17 p.

Results of grindability tests on a wide variety of ores, made in the Allis-Chalmers laboratory since 1943, when the last list was published. Standard ball-mill and standard rod-mill grindability tests, impact-crushing tests, and comparative open-circuit and standard grindability tests at 200-mesh.

1-122. Rod Milling—Plant and Laboratory Data. J. F. Myers, S. D. Michaelson, and F. C. Bond. *Mining Technology*, v. 2, July 1947, T. P. 2175, 11 p.

Thirteen wet rod-milling and one roll-crushing operation, in which different ores were ground to different sizes under different conditions. Laboratory rod-mill grindability tests were made on each ore, and the plant-grinding efficiencies were calculated.

1-123. The Flotation of Fluorite. Enid C. Plante. *Mining Technology*, v. 2, July 1947, T. P. 2163, 19 p.

Experiments with several long-chain collectors available commercially and the use of sodium cetyl sulphate as a collector for fluorite. Laboratory tests and extension of the work to batch tests in the flotation machine. A method for determining the adsorption of sodium cetyl sulphate on fluorite. 28 ref.

1-124. Taconite Metallurgy. D. C. Jackling. *Mining World*, v. 9, Sept. 1947, p. 35-37, 91.

Microstructures of various taconites. Concentration flow sheets.

1-125. Intermediate Ore Problems. *Mining World*, v. 9, Sept. 1947, p. 38-41, 43.

Developments in the concentration of iron ore of intermediate grades.

1-126. Ore-Dressing Notes. *Mining Magazine*, v. 77, Sept. 1947, p. 153.

Bucket test shows whether a given ore responds to upgrading by the methods used in heavy-media separation.

1-127. The Centrifugal Ball-Mill Classifier. C. Erb Wuensch. *Mining Congress Jounal*, v. 33, Sept. 1947, p. 22-25, 49.

Results of experiments with a vertical ball mill which combines grinding with partial classification.

1-128. Notes on the Treatment of Ore Containing Pyrrhotite at Sub Nigel. *Journal of the Chemical, Metallurgical & Mining Society of South Africa*, v. 47, May 1947, p. 420-425.

Discussion of paper by Andrew King, A. Clemes, and H. E. Cross (Feb issue).

1-129. The Gamma-Ray Measurement of Radium Ore Concentrates. W. J. Hushley and W. R. Dixon. *Canadian Journal of Research*, v. 25, Sec. A, July 1947, p. 210-222.

A method for measuring the radium content of substances in which the concentration is of the order of micrograms per gram of material. Gamma-ray activities of the unknown and of a standard radium capsule are compared by means of Geiger-Müller counters.

1-130. Variable Speed Drives in Ore Conversion Plant. Francis A. Westbrook. *Industry and Power*, v. 53, Oct. 1947, p 95-96.

Roaster agitators turning as slow as ½ r.p.m. are driven by constant speed motors through gear reducers and variable speed drives.

1-131. The Settling of Mineral Particles in Water. L. W. Needham and H. W. Hill. *Fuel in Science and Practice*, v. 26, July-Aug. 1947, p. 101-111.

Some new data on the settling of coal particles in water, and correlates the work of various investigators. Practical applications not discussed. Experimental methods and results. The work should be of especial value to the ore dresser. 13 ref.

1-132. The Application of Xanthates to Flotation. Norman Weiss. *Mining Technology*, v. 11, Sept. 1947, T.P. 2213, 12 p.

Summarizes results of a recent survey of North American plants.

1-133. Norwegians Conquer Taconite. *Mining World*, v. 9, Oct. 1947, p. 22-26.

Methods used at Norwegian mine to reduce taconite to usable form. Milling and concentration data. Magnetic separation and sintering are important steps.

1-134. Lean Ores. W. Luyken. *Iron and Steel*, v. 20, Oct. 1947, p. 471-475.

German experience in the concentration of lean iron ores. Character of the different ores; new ore-preparation, concentration, and acid-smelting processes; magnetizing, roasting, and subsequent magnetic separation; roasting of spathic ores; and acid smelting. 10 ref.

1-135. What Needs Doing in Ore Dressing. Edmund J. Pryor. *Mining and Metallurgy,* v. 28, Oct. 1947, p. 512-515.

The need for more fundamental knowledge of what takes place in the treatment of an ore.

1-136. The Dressing of the Lesser Metallic Minerals. F. B. Michell. *Mine & Quarry Engineering,* v. 13, Oct. 1947, p. 300-306.

The dressing of ores of aluminum, antimony, bismuth, cobalt, chromium, and manganese. (To be continued.)

1-137. Experimental Basis of a Test Method and of a Method for Laboratory Preparation of Samples for Analysis. N. V. Bargshev. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 521-532. (In Russian.)

Effect of sample weight and grain size on analytical results. The work was on lead-zinc, tungsten, molybdenum, tin, and other ores. Use of the results should save considerable time which is ordinarily spent in crushing finer than necessary.

1-138. Beneficiation of Western Manganese Ores. C. H. Schack and H. G. Poole. *Bureau of Mines R. I. 4117,* Sept. 1947, 38 p.

Summarizes and correlates the information obtained during the war by the Bureau in the course of which 288 lots of ore from 135 different deposits were subjected to ore-dressing investigations. The various ores are classified as oxide, carbonate, silicate, and complex types.

1-139. Pilot Mill Concentration of Las Vegas Wash Manganese Ore, Boulder City, Nev. S. R. Zimmerley and C. H. Schack. *Bureau of Mines R. I. 4123,* Sept. 1947, 31 p.

A pilot-plant study of the process for beneficiating 28% Mn ore. The method comprises crushing and grinding to obtain a minimum of slimes, sizing the ground ore into three fractions, and flotation of the gangue. Results indicate commercial feasibility.

1-140. Recovery of Soda and Removal of Sulphate in the Lime-Soda Process for Alumina Production. Francis J. Frattali, Stanley J. Green, and Verda I. McLendon. *Bureau of Mines R. I. 4126,* Sept. 1947, 14 p.

Study of the Na_2CO_3-Na_2SO_4-$NaOH$-H_2O system furnished sufficient information for development of a satisfactory method for removal of sulphate introduced into the sinter by oxidation of pyrites present in the ore and by combustion of sulphur in the fuel. Phase diagrams for the system; the extraction method.

1-141. Concentration of Oxide Manganese Ore From the Ophir Hill Mine, Ophir, Tooele County, Utah. S. J. Hussey, T. F. Mitchell, and J. A. McAllister. *Bureau of Mines R. I. 4130,* Oct. 1947, 6 p.

It was found possible to recover 86% of the manganese as 35% Mn by washing and desliming minus 1-in. ore and to meet Metals Reserve Co. specifications without sintering. Tabling a small amount of original sands provided a factor of safety. Coarse crushing and gravity concentration of nodules obtained by washing and sizing produced a 48% sinter containing 80% of the manganese.

1-142. The Effect of Grain-Size Distribution on the Flotability of Sulphide Minerals. I. N. Plaskin and G. N. Khazhinskaia. *Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences,* June 1947, p. 757-765. (In Russian.)

A study of flotation in relation to grain size for a number of minerals (galena, chalcopyrite, chalcosine, and pyrite) under the influence of depressors, activators, and oxidizers. 11 ref.

1-143. Raw Materials for Iron and Steel Making. Herbert W. Graham. *Mining and Metallurgy,* v. 28, Nov. 1947, p. 538-542.

Interdependent characteristics which affect the geologist, mining engineer, metallurgist, and plant operator.

1-144. Recherches sur la Separation des Sels d'Uranium dans un Traitement de Betafite. (Investigations on the Separation of Uranium Salts in the Treatment of Betafite.) M. Bachelet. *Bulletin de la Société Chimique de France,* v. 14, July-Aug. 1947, p. 628-632.

Various methods of separating the uranium from this mineral were studied, and fusion with soda was found to give the best results. Fractional precipitation of the hydroxides may be used to obtain the uranyl salts which are transformed into nitrates and purified by dissolving in ether.

1-145. Automatic Controls Cut Milling Costs. *Engineering and Mining Journal,* v. 148, Nov. 1947, p. 138-145.

Intelligent use of modern automatic, or work-saving, devices in crushing, grinding, and flotation.

1-146. For Less Expensive Grinding. *Engineering and Mining Journal,* v. 148, Nov. 1947, p. 146-149.

Some of the more recent developments in equipment and methods.

1-147. Separation. *Engineering and Mining Journal,* v. 148, Nov. 1947, p. 150-153.

Some new developments, mainly modifications of well-known equipment, such as tables, magnetic separators, classifiers, heavy-media separators, cyclones, thickeners, cyanide mixers.

1-148. The Dressing of the Lesser Metallic Minerals. (Concluded.) F. B. Michell. *Mine & Quarry Engineering,* v. 13, Nov. 1947, p. 334-342.

Magnesium; mercury; molybdenum; nickel; tantalum; thorium; titanium; uranium; and vanadium. 28 ref.

1-149. Application of the Bird Centrifuge at Hedley Mascot Mill. C. W. S. Tremaine. *Canadian Institute of Mining and Metallurgy, Transactions* (bound with *Canadian Mining and Metallurgical Bulletin*), v. 50, Oct. 1947, p. 533-536.

Application to a gold ore in which the sulphides are oxidized in many sections and the breccia filled in with a very soft, hydrous iron silicate. This latter material slimed very badly and disrupted the entire circuit which had been operating on another type of ore in which the gold was intimately associated with arsenopyrite and pyrrhotite in highly silicified and garnetized limestone gangue. The thickeners and drum filter would not handle the new ore, but good results have been obtained with the centrifugal machine.

1-150. An Apparatus for Comparing Various Zinc Dusts for Gold and Silver Precipitation. Dwight J. A. Dahlgren. *Canadian Institute of Mining and Metallurgy Transactions* (bound with *Canadian Mining and Metallurgical Bulletin*), v. 50, Oct. 1947, p. 558-566.

In the zinc-dust precipitation of gold and silver from pregnant cyanide solutions, various zinc dusts differ in efficacy. For example, distilled zinc dust is superior to atomized zinc dust, and one variety of distilled zinc dust may be better than another. Details of apparatus for quantitative comparison of the dusts, and its operation.

1-151. Iron Powder From the Mesaba. *Industrial and Engineering Chemistry,* v. 39, Nov. 1947, p. 8A, 10A.

Principles of new plant being constructed in the Mesaba for production of high-grade iron powder from low-grade iron carbonate slate.

1-152. Presidential Address: Modern Metallurgical Practice on the Witwatersand. A. Clemes. *Journal of the Chemical, Metallurgical and Mining Society of South Africa,* v. 48, Aug. 1947, p. 44-58; discussion, p. 58-64.

Review of methods used.

1-153. The Treatment of Gold Ore Containing Pyrrhotite at the Sub Nigel, Ltd. D. L. Carson. *Journal of the Chemical, Metallurgical and Mining Society of South Africa,* v. 48, Aug. 1947, p. 64-66.

Effect of pyrrhotite in the ore at Marievale Consolidated Mines, Ltd., compared with information given by A. King, A. Clemes and H. E. Cross in their paper (Feb. issue).

1-154. The Yellow Pine Mill. *Mining World,* v. 9, Nov. 1947, p. 26-31.

Mining and beneficiation of antimony-gold ore. Stibnite recovered by flotation.

1-155. Treatment at the Bibiani Gold Mine, West Africa. H. A. McGowan. *Bulletin of the Institution of Mining and Metallurgy,* Nov. 1947, p. 1-24.

Details of treatment; flow sheets and procedures.

1-156. Developments of Carbon Cyanidation at Getchell Mine, Nevada. Royce A. Hardy and F. W. McQuiston, Jr. *Mining Congress Journal,* v. 33, Nov. 1947, p. 42-43.

The carbon cyanide treatment of complex gold ores has considerable merit when treating ores presenting thickening and filtering problems.

1-157. Notes on Drying for Electrostatic Separation of Particles. Foster Fraas. *Mining Technology,* v. 11, Nov. 1947, T.P. 2257, 14 p.

The electrostatic separation of broken solids by use of differences in conductance, differences in contact potential, frictional electricity, or in dielectric constant; effects of the presence of moisture or other liquid in various proportions. Water present in volumes greater than permissible can be removed mechanically (by centrifuge) or by evaporation. Recovery of the dielectric liquid medium in the dielectric-constant method of separation. 23 ref.

1-158. Effect of "Metso" (Sodium Metasilicate) on Mill Recoveries of Alta-St. Louis Ores. Henry P. Ehrlinger. *Mining Technology,* v. 11, Nov. 1947, T.P. 2272, 3 p.

Particles of gold and galena were badly coated with slime after grinding. Addition of metasilicate resulted in defloculation of the slime in the pulp and in cleaning of the surfaces of the mineral particles so they were more amenable to flotation. Sodium silicate did not improve the results to any extent.

1-159. Factors Which Control Liquation in Metallurgy. E. A. Peretti. *Engineering and Mining Journal,* v. 148, Dec. 1947, p. 76-78.

In extractive metallurgy, liquation is the process of separating a fusible

substance from one less fusible by melting one or more of the constituents. Fundamentals of this process and the effects of various factors such as relative size of the different particles involved and viscosity of the different phases.

1-160. Methods for Preparation of Samples From Iron and Manganese Ores and Unslaked Lime. S. M. Khripach. *Factory Laboratory (U.S.S.R.),* v. 13, Aug. 1947, p. 1008-1009. (In Russian.)

Unslaked lime is often mixed with ores in the wintertime in the U.S.S.R. to prevent freezing. Various methods for sampling from the ore cars were evaluated by comparative analysis.

1-161. Separating Fine Particles. *Chemical Age,* v. 57, Nov. 22, 1947, p. 671.

A new selective method based on a a British patent application by two Swedish investigators is an air-classification technique suitable for aluminum or other powders of leaf or needle shapes.

SECTION II

SMELTING AND REFINING

2-1. Production of Low-Silicon Basic Iron in the Blast Furnace Using High-Magnesia Slags. M. E. Nickel. *Blast Furnace and Steel Plant,* v. 34, Dec. 1946, p. 1522-1526.

Results obtained while operating a blast furnace on high-magnesia slags to produce low-silicon basic hot metal directly in the blast furnace. While insufficient work has been carried out to substantiate any definite conclusions, results indicate that economic production can be carried out with normal furnace operation.

2-2. The Effect of Cell Variables on the Electrowinning of Manganese. J. H. Jacobs. *Electrochemical Society Preprint* 90-35, 1946, 10 p.

An electrolytic manganese pilot plant having a daily capacity of 2000 lb. has been operated by the Bureau of Mines for the past 5 years. Results recorded are on the effect of certain variables on the electrodeposition of manganese, namely, electrode spacing, rate of feed to the cells, manganese concentration in the cell catholyte, and length of cell operation before cleaning.

2-3. Automatic Control of Soaking Pits. C. H. Stone. *Metallurgia,* v. 35, Nov. 1946, p. 18-22.

Requirements of soaking pits, their design and type according to the fuel to be used. Particular attention is directed to the heating cycle with the object of instituting controlled conditions in the pits to facilitate work in the mill.

2-4. Electronic-Frequency-Converting Equipment Used for Production Melting of Alloy Steels. *Industrial Heating,* v. 13, Dec. 1946, p. 1990, 1992.

Installation includes a 300-kw. electronic frequency changer; a steel tank mercury-arc converter equipped with vacuum pumps; a transformer to which three-phase, 60-cycle power is supplied through a standard metal-enclosed oil circuit breaker at 6900 volts; two induction melting furnaces, each capable of melting 650 lb. of steel, but so constructed that coils for melting 1000 lb. can be substituted in the future.

2-5. Fluidity of Converter and Electric Steels. *Iron Age,* v. 158, Dec. 26, 1946, p. 65.

Relationship between temperature and fluidity of converter and electric furnace steels. One of the conclusions reached was that temperature rather than steelmaking method is the deciding factor in fluidity. Support of this statement was found in a report describing the use of a spiral to which was attached a pouring basin, making it suitable for bottom-poured ladles. (Account of first technical convention of the British Steel Founder's Assoc. at Sheffield, England.)

2-6. Production of Low-Silicon Basic Iron in the Blast Furnace Using High Magnesia Slags. M. E. Nickel. *Blast Furnace and Steel Plant,* v. 34, Dec. 1946, p. 1522-1526.

Results obtained indicate tentatively that use of the high magnesia slag will permit economic production with normal furnace operation.

2-7. Thermal Production of Magnesium. L. M. Pidgeon. *Canadian Institute of Mining and Metallurgy Transactions,* v. 49, Dec. 1946, p. 621-635.

Small-scale experiments on various direct reduction reactions leading to choice of the ferrosilicon reduction of dolomite, and the realization that this reaction would proceed at a satisfactory rate at temperatures obtainable in metal apparatus.

2-8. Graphite Molds for Casting Vertical Steel Ingots. S. W. House and T. Killman. *Iron Age,* v. 159, Jan. 16, 1947, p 59-63.

Experiences encountered by the Texas Steel Co. in producing a total of 538 steel ingots, in a single vertical graphite mold (two-part design). In

addition to the metallurgical advantage of producing steel with a more homogeneous structure than can be obtained with an iron mold, several economic advantages, such as reductions in mold cost, labor (stripping cost), and ingot surface conditioning costs were also realized.

2-9. **Outokumpu's Copper Smelter Doubles Output During War.** P. Bryk, K. I. Levanto, Eero Makinen, and John Ryselin. *Engineering and Mining Journal,* v. 148, Jan. 1947, p. 68-72.

Operations at Finnish smelters.

2-10. **Iron Substitutes in Openhearth Charges.** R. R. Fayles. *Iron Age,* v. 159, Jan. 23, 1947, p. 57-59.

Various carbonaceous materials available; successful utilization of a combination of anthracite coal and byproduct coke.

2-11. **Electric Furnace Practices for Melting Openhearth Grades of Carbon Steel.** Charles W. Briggs. *Metal Progress,* v. 51, Jan. 1947, p. 71-75.

Outlines some of the papers presented at the December 1946 meeting of A.I.M.E. held in Pittsburgh. Electric furnace electrodes; scrap distribution; basic electric oxidizing period; rimmed basic steel and semikilled electric steel; argon gas used in steel melting; acid electric slags; sulphur and what can be done about it; metallurgy of quality steel.

2-12. **Theoretical Thermal Studies of Steel Ingot Solidification.** Victor Paschkis. *Industrial Heating,* v. 14, Jan. 1947, p 70-72, 74.

Time required to cool the steel from the pouring temperature to any given and desired low temperature.

2-13. **Electrolytic Lithium.** *Chemical Age,* v. 56, Jan. 4, 1947, p. 19.

Equipment and operations used in a German plant to collect lithium which analyzes 97% purity.

2-14. **Pilot-Plant Investigations—Production of Sponge Iron With Producer Gas.** D. R. Torgeson, T. E. Evans, and R. G. Knickerbocker. *Bureau of Mines Report of Investigations* 3994, Dec. 1946, 42 p.

Producer-gas reduction of fine ores was evaluated in a Skinner multiple-hearth furnace. Results showed that fine ores can be reduced satisfactorily by producer gas at temperatures between 850 and 950° C. Gas-utilization efficiencies were comparatively low. Previous work reviewed, experimental work and results presented in detail. 17 ref.

2-15. **Electrolytic Cobalt—A Commercially Feasible Process.** F. K. Shelton, Ruth E. Churchward, J. C. Stahl and C. W. Davis. *Electrochemical Society Preprint* 91-4, 1947, 71 p.

Method of electrowinning cobalt from cobaltite ores. Process comprises roasting the ore, extracting the arsenates from the calcine by a caustic leach, extracting the cobalt from the residual solids in an acid leach, purifying the leach solution, preparing cobalt carbonate from the purified solution, and finally electrodepositing metallic cobalt from a $CoSO_4$ electrolyte at 60° C. in a cyclic operation in which the cobalt carbonate is used to neutralize the acid electrolyte. Data for the estimation and design of a commercial plant, and alternative procedures for different economic and technical conditions.

2-16. **The Mechanism of the Carbon-Oxygen Reaction in Steelmaking.** C. E. Sims. *Metals Technology,* v. 14, Jan. 1947, T. P. 2129, 14 p.

The physical chemistry of reaction with major emphasis on the mechanisms involved; relates these mechanisms to recently published data. 11 ref.

2-17. **Nonferrous Metallurgists Cut Costs and Slag Losses.** Carle R. Hayward. *Engineering and Mining Journal,* v. 148, Feb. 1947, p. 112-114.

Possible improvements in copper casting. Copper slag washing.

2-18. **Use of Oxygen in the Openhearth Bath.** G. V. Slottman and F. B. Lounsberry. *Iron Age,* v. 159, Feb. 20, 1947, p. 42-45.

Preliminary report on the first large-scale application of oxygen to an openhearth furnace bath. Operating technique.

2-19. **Acid Electric Melting.** Norman F. Dufty. *British Steelmaker,* v. 13, Feb. 1947, p. 80-86.

Advantages and disadvantages of refractories; charging and melting; oxidizing; slag control; deoxidation.

2-20. **Metallurgy of Lead.** A. D. Turnbull. *Mining and Metallurgy,* v. 28, Feb. 1947, p. 61-62.

1946 developments in recovery of lead, such as those in direct smelting, in the improvement of sintering, and in the further mechanization of refineries.

2-21. **Zinc Metallurgy.** W. M. Peirce. *Mining and Metallurgy,* v. 28, Feb. 1947, p. 66.

1946 developments in recovery of zinc; plant expansions and labor-saving devices.

2-22. **Ductile Melted Molybdenum.** *Metal Industry,* v. 70, Feb. 7, 1947, p. 106, 113.

Production by the vacuum-arc method. Mechanical properties of cast ductile molybdenum.

2-23. **Dephosphorized Bessemer Steel.** G. M. Yocom. *Metal Progress,* v. 51, Feb. 1947, p. 243-247.

Development of a practice for dephosphorizing bessemer steel by blowing it hot, holding back the slag in the vessel by a temporary wood-block dam and adding the ingredients of a dephosphorizing slag to the stream of metal as it is poured into the ladle. Such a steel has different qualities from an openhearth steel of the same nominal analysis, and this fits it for certain applications such as flat-rolled products, rods and wire.

2-24. **Nonferrous Metals.** John L. Everhart. *Metals Review,* v. 20, Feb. 1947, p 5-7.

1946 developments in production and properties, excluding the light metals; superalloys for high-temperature service; copper alloys; other nonferrous alloys; powder metallurgy.

2-25. **Technology of Aluminum and Magnesium.** L. W. Eastwood. *Metals Review,* v. 20, Feb. 1947, p. 7-8, 51.

Advances reported during 1946 in production and properties.

2-26. **Products and Processes for the Nonferrous Industry.** *Metals Review,* v. 20, Feb. 1947, p. 9-11, 14-15, 17.

New production equipment and improved compositions, as described by the manufacturers.

2-27. **Some Economics of Blast Furnace Operation.** James Dale. *Blast Furnace and Steel Plant,* v. 35, Feb. 1947, p. 220-223.

Variations in the characteristics of the coke, the ore, and the limestone, used as raw materials. How increased attention to testing these materials and to the setting up of price differentials for quality variations can save money for the industry. (Abstracted from paper read before the Cleveland Society of Engineers at Middlesborough England.)

2-28. **Thermal Requirements for Blast Furnace Operation.** Charles E. Agnew. *Steel,* v. 120, March 3, 1947, p. 130-132, 166, 168.

Operating practice at blast furnaces burdened on raw materials peculiar to eastern, southern, and northern districts. (To be continued.)

2-29. **Ingot Mold Usage.** N. H. Bacon. *Iron and Steel,* v. 20, Feb. 1947, p. 55-58.

The value of statistical methods in its study. (To be concluded.)

2-30. **Basic Openhearth Slags. Part I.** K. L. Fetters and E. W. Mahaney. *Iron Age,* v. 159, March 6, 1947, p. 62-66.

Chemistry, mineralogy, control, and operating significance of various slags.

2-31. **The Manufacture of Steel in the Acid Openhearth Furnace by the Scrap-Carbon Process.** B. Yaneske. *Journal of the Iron and Steel Institute,* v. 155, Jan. 1947, p. 24-26.

Indian scrap-carbon process using 100% steel scrap in which petroleum coke replaces carbon and acid slag replaces silicon. The hearth is protected from erosion by spreading an easily fusible silica sand over the banks before charging and manganese ore is used instead of iron ore for oxidizing the carbon. The quality of the nickel-chromium steel made by this process is claimed to be as high as that obtained by the pig-and-scrap process and yields are said to be higher.

2-32. **First Report of the Side-Blown Converter Practice Subcommittee of the Steel Castings Research Committee.** *Journal of the Iron and Steel Institute,* v. 155, Jan 1947, p. 33-50.

Varying design and operating technique have been studied with regard to the various factors involved. The acid side-blown process and the acid openhearth process appear to be markedly similar with respect to reactions involved, properties of resulting steels, and thermal efficiency.

2-33. **Thermal Requirements for Blast Furnace Operation. Part II.** Charles E. Agnew. *Steel,* v. 120, March 10, 1947, p. 106, 109-110, 112.

Factor for determining amount of heat consumed in reduction of iron from the silicate is computed. (To be continued.)

2-34. **Prospects for the Use of Oxygen in Blast Furnaces.** I. P. Bardin. *Bulletin of the Academy of Sciences of U.S.S.R.,* Section of Technical Sciences, no. 10, 1946, p. 1385-1399. (In Russian.)

A short historical review emphasizes the importance of systematic research on the application of the oxygen blast in the iron industry. Some of the technical problems involved; diagrams and charts.

2-35. **Experiments of Steel Production Using Oxygen Blast in a Bessemer Converter at the Stalin-Kusnetzky Plant.** V. V. Kondakov. *Bulletin of the Academy of Sciences of U.S.S.R.,* Section of Technical Sciences, no. 10, 1946, p. 1401-1420. (In Russian.)

Experiments prove the applicability of the process to low-silicon pig irons. The steel obtained had improved mechanical properties, a low nitrogen content, and a very good microstructure. Consumption of oxygen was 40 cu. m. per ton, which corresponds to the theoretical value. However, the converters must be redesigned and adapted to the higher temperature of smelting.

2-36. **Molecular State of Openhearth Slags and Distribution of Oxygen and**

Sulphur in the System Metal-Slag. A. S. Heinman. *Bulletin of the Academy of Sciences of U.S.S.R.,* Section of Technical Sciences, no. 10, 1946, p. 1439-1457. (In Russian.)

A general qualitative picture of the molecular structure of simple silicon melts of openhearth slags. On the basis of the data obtained, the distribution of sulphur and oxygen between basic openhearth slags and metal is calculated. 34 ref.

2-37. Heat Transfer in a Liquid Bath Stirred by Gas Bubbles. M. A. Glinkov and V. S. Kocho. *Bulletin of the Academy of Sciences of U.S.S.R.,* Section of Technical Sciences, no. 10, 1946, p. 1463-1472. (In Russian.)

Investigations of openhearth smelting resulted in development of certain criteria characterizing the transition of such a bath from the stratified condition to the turbulent state. The relation between these criteria and the coefficient of the heat transfer was determined, and the dependence of the coefficient on the amount of gas being bubbled and on the viscosity of the liquid was established.

2-38. Investigation of Viscosity and Fusibility of Blast Furnace Slags That Are Normal According to Pavlov. I. P. Semik. *Bulletin of the Academy of Sciences of U.S.S.R.,* Section of Technical Sciences, no. 11, 1946, p. 1655-1671. (In Russian.)

Data obtained by experimental investigation of 16 slags recommended by M. A. Pavlov for smelting of different types of cast irons indicate that the surface films of basic slags are much more viscous than the fluid mass, a fact not taken into consideration by most investigators, thus resulting in some erroneous viscosity data.

2-39. Basic Openhearth Slags. Part II. K. L. Fetters and E. W. Mahaney. *Iron Age,* v. 159, March 13, 1947, p. 64-68.

The mineralogy of openhearth slags and use of the petrographic microscope as a basis for a better understanding of slag constitution. Concepts of slag-metal relations and slag control from the standpoint of reducing lime consumption and slag volume and increasing production rates.

2-40. Recent Developments in Steelmaking. J. A. Kilby and W. G. Cameron. *Metallurgia,* v. 35, Feb. 1947, p. 215-220.

Various processes employed and the economic as well as metallurgical aspects involved; the basic openhearth process as a method of steelmaking for high rates of production under widely varying conditions of burden and metallurgical load. (Condensed from paper for Institution of Engineers and Shipbuilders in Scotland.)

2-41. Some Questions on Interrelated Processes Going on in the Blast Furnace. B. M. Larsen. *Metals Technology,* v. 14, Feb. 1947, T. P. No. 2132, 13 p.

Some views held tentatively by the author, including a certain amount of evidence from operating records. Questions or problems which are believed suitable for investigation.

2-42. Soda Treatment of Blast Furnace Drosses at El Paso Smelter. A. A. Collins. *Metals Technology,* v. 14, Feb. 1947, T. P. No. 2139, 6 p.

New dross smelting process for lead metallurgy which has been applied with complete success for several years to drosses containing 12 to 40% copper. Three older methods had failed to give satisfactory results.

2-43. Slaggkontroll vid den Basiska Martinprocessen. (Slag Control in the Basic Openhearth Steel Process.) Torsten Collen. *Jernkontorets Annaler,* v. 130, no. 12, 1946, p. 649-652.

An introduction to four separate reports presented by a committee appointed in 1942 by the technical research board of Jernkontoret. As a result of the investigations the author believes that it is possible for the metallurgist in practical work to judge the composition of the slag with the aid of slag cake tests.

2-44. Undersökning av Löslighetsförhallandena i Fast Tillstand i de Binära Systemen av Oxiderna CaO, MnO, MgO och FeO. (Investigations of the Solubility in the Solid State in the Binary Systems of the Oxides CaO, MnO, MgO and FeO.) Holger Pettersson. *Jernkontorets Annaler,* v. 130, no. 12, 1946, p. 653-663.

Solubility of the above basic slag systems was studied by means of X-rays. The carbonates or oxalates were mixed in a mortar and rammed into small cylinders. The samples were held at 900 to 1600° C. and cooled slowly. Examination indicates that complete solubility probably exists in the systems CaO-MnO, MnO-MgO, MgO-FeO, and FeO-MnO. A certain mutual solubility was established in the system CaO-FeO. 19 ref.

2-45. Undersökning av Basiska Martinslagger i Metallmikroskop. (Microscopical Investigations of Basic Openhearth Slags in Reflected Light.) Holger Pettersson and Sven Eketorp. *Jernkontorets Annaler,* v. 130, no. 12, 1946, p. 664-677.

In order to follow changes in slag constitution during melting, polished specimens were examined using a metallurgical microscope. By means of a ternary phase diagram based on that of the system $CaO\text{-}MgO\text{-}SiO_2$, an attempt has been made to depict the course of solidification and explain the microstructure of the slags.

2-46. Bedömning av Basisk Martinslagg med Hjälp av Slaggkakor. (Estimation of the Composition of Basic Openhearth Slags by Means of Slag Cakes.) Holger Pettersson. *Jernkontorets Annaler,* v. 130, no 12, 1946, p. 678-702.

Possibility of estimating the composition of basic openhearth slags from the appearance of slag cakes. Slag samples were collected from different iron works, analyzed, and the appearance of the cakes studied. Influence of certain factors on the appearance of the top and bottom surface and the fracture of a slag cake; connection between appearance and chemical composition. Error of the basicity estimation was seldom found to exceed 10%. The FeO content is more difficult to estimate.

2-47. Percentage Losses of Alloying Constituents in the High-Frequency Furnace as Compared to the Arc Furnace. C. Ciamberlini. *Engineers' Digest (American Edition),* v. 4, Feb. 1947, p. 91-92.

Expensive losses occur when preparing Cr-W-Mo-V toolsteels. These losses can be completely eliminated by use of a high-frequency furnace and putting these alloying constituents into the cold charge. (Condensed from *L'Ingegnere, Italy,* Aug. 1946, p. 616.)

2-48. Thermal Requirements for Blast Furnace Operation. Charles E. Agnew. *Steel,* v 120, March 17, 1947, p. 120-122, 124, 126, 128.

Weight of moisture per ton of iron said to be most accurate indicator of effect of blast moisture on fuel economy. Heat generation, consumption, and losses in the three iron producing districts are analyzed. (To be continued.)

2-49. Ferrous Production Metallurgy in 1946. T. B. Winkler and J. S. Marsh. *Mining and Metallurgy,* v. 28, March 1947, p. 150-151.

Sponge iron, blast furnace, openhearth, and electric-furnace developments, including use of oxygen.

2-50. Slagging Gas Producer for Melting Foundry Iron. H. LaPlanche. *Metal Progress,* v. 51, March 1947, p. 447-450.

Installation consists of a gas-producer cupola with a capacity of 3 tons per hr. Results demonstrate the utility of the gas-producer cupola in melting iron for hot charges into an openhearth furnace producing a hot iron of low phosphorus content, which can be rapidly refined, and at the same time making a gas of good calorific value for use either in the openhearth furnace itself or in other necessary heating operations around the steel mill.

2-51. Thermal Requirements for Blast Furnace Operation. Charles E. Agnew. *Steel,* v. 120, March 24, 1947, p. 104, 106-107.

Enrichment of the blast with oxygen as a means of increasing the heat in the hearth and bosh; the wide difference in the weight of raw materials used in the production of a ton of pig iron.

2-52. Observations on Coke Oven and Blast Furnace Practice at the Geneva Plant. C. L. Waggoner. *Blast Furnace and Steel Plant,* v. 35, March 1947, p. 325-328.

Problems involved in using Utah coal generally considered as noncoking, and which varies considerably in quality. Limestone and iron ore available and the practices developed for their satisfactory utilization.

2-53. Blowing Oxygen-Enriched Air Into the Blast Furnace. Kurt Neustaetter. *Blast Furnace and Steel Plant,* v. 35, March 1947, p. 329-332.

Theory; the German experimental runs; the meager and vague information that has come out of Russia. (Paper presented before the Blast Furnace and Coke Association of the Chicago District, Jan. 31, 1947.)

2-54. Some Economics of Blast Furnace Operation. Part II. James Dale. *Blast Furnace and Steel Plant,* v. 35, March 1947, p. 340-343.

Benefits to be obtained from certain crushing, sizing, and ore preparation techniques, with especial reference to a certain British ore. Refers to several papers on the subject.

2-55. Control of Sulphur Content of Sponge Iron Produced in Rotary Kilns. R. C. Buehl, E. P. Shoub and J. P. Riott. *Bureau of Mines Report of Investigations 4057,* March 1947, 102 p.

Results of pilot-plant tests on the reduction of iron ore in a rotary kiln, performed at Johnstown, Pa., and laboratory tests at the Bureau of Mines Central Experiment Station, Pittsburgh, Pa. 32 ref.

2-56. Reduction of Magnesium Chloride by Calcium Carbide. Lloyd R. Michels, Burke Cartwright and S. F. Ravitz. *Bureau of Mines Report of Investigations 4059,* March 1947, 8 p.

A laboratory investigation of the above reaction was made. Results indicate that the reaction is not promising for commercial production.

2-57. Increases Steel Output by Oxygen Impingement Technique. *Steel,* v. 120, March 31, 1947, p. 88.

Increasing temperature of the openhearth bath by the use of oxygen reduces time of heats from 12 to between 6 and 7 hr. At first oxygen was injected into the bath through a lance thrust into the metal bath to the depth of 6 to 10 in. Now, instead of being blown into the bath, oxygen is impinged on the surface of the bath at high velocity.

2-58. The Manufacture of Oxygen in Large Quantities for Industrial Uses. Martin J. Conway. *Iron and Steel Engineer,* v. 24, March 1947, p. 53-58; discussion, p. 58-60.

The methods used and recent experiments in use of oxygen in openhearth and blast furnace operations. The economics of these uses.

2-59. Recent Developments in Rare Metals. *Steel,* v. 120, April 7, 1947, p. 93-94, 124, 126, 130, 133.

Advances in technology of thorium, uranium, and zirconium production due to simplification of design and use of high-purity metals in their preparation rather than any changes in basic methods.

2-60. Need Grows for Smelting Fine Iron Ores. *Steel,* v. 120, April 7, 1947, p. 97.

Some of the immediate problems which confront steelmakers, including New York State concentrates, bessemer practice, use of oxygen and high top pressures in blast furnaces, and electric furnace practice.

2-61. Blast Furnace Operation and Materials. *Industrial Heating,* v. 14, March 1947, p. 410, 412, 414.

Factors affecting operating efficiency of blast furnaces, including the physical characteristics of the materials charged. Furnace size and the relationship of furnace auxiliaries to efficiency were included in the discussion, which is limited to soft-ore practice. (Summary of paper by H. W. Johnson read before recent meeting of Pittsburgh Chapter, A.S.M.)

2-62. Recovery of Metals by Electrolysis. W. H. Dennis. *Mine & Quarry Engineering,* v. 13, March 1947, p. 75-82.

The essential features of the recovery of copper, lead, nickel, precious metals, aluminum, magnesium, manganese, zinc, and cadmium, by electrolytic means.

2-63. Acid Electric Steel for Castings. Sam F. Carter and C. K. Donoho. *Electrochemical Society Preprint 91-12,* 1947, 18 p.

Production of steel for castings in the acid-lined electric-arc furnace from the standpoint of the effect of variables in melting practice and final deoxidation on the quality of the steel as revealed by tensile tests. Experimental data treated statistically to reveal effects of several commercial practices; and the theoretical background used to explain the effects noted. A furnace practice to produce high quality steel; effects of final deoxidation methods.

2-64. Application of Slag Control and an Investigation of Basic Openhearth Furnace Slags. T. Fairley. *Journal of the Iron and Steel Institute,* v. 155, Feb. 1947, p. 161-171.

A method of slag control for fixed basic openhearth furnaces which is based on a combination of existing practices, and results of a statistical survey of the chemical compositions of the melting and tapping slags of 250 casts made by its application.

2-65. The Determination of the Equilibrium Constant of the Reaction Between Molten Iron and Hydrogen Sulphide. J. White. *Journal of the Iron and Steel Institute,* v. 155, Feb. 1947, p. 201-212.

Attempts to determine the value of the constant made by use of a high-temperature balance and in a modified apparatus in which four small beads of metals were subjected simultaneously to the action of the gases in a reaction chamber small enough to be contained entirely in the hot zone of the furnace. Apparatus, procedure, and results.

2-66. O Problema do Hidrogenio Na Producao de Aco. (The Problem of Hydrogen in Steel Production.) Luiz Correa da Silva. *Boletim da Associacao Brasileira de Metais,* v. 3, Jan. 1947, p. 39-62; discussion, p. 62-64.

A critical review of existing theories, including an attempt to reconcile contradictory points of view. 17 ref.

2-67. Eletro-Acos Basicos. (Basic Electric Steels.) Ferruccio Fabriani. *Boletim da Associacao Brasileira de Metais,* v. 3, Jan. 1947, p. 65-77; discussion, p. 77-78.

Using 250 specimens of S.A.E. 1025 steel, variations in mechanical and chemical properties corresponding to different runs were studied. Production technique emphasizing the differences between laboratory production and production on an industrial scale.

2-68. Generalidades Sobre as Grandes Lingoteiras. (Generalities Concerning Large Ingot Molds.) Manoel A. Moraes. *Boletim da Associacao Brasileira de Metais,* v. 3, Jan. 1947, p. 185-203; discussion, p. 203-206.

A compilation of data concerning the production of the above. It discusses methods of molding, different compositions used, shapes and dimensions, and chemical properties of the materials used. In the study of defects, the phenomenon of growth was found to occur in iron subject to severe temperature conditions. Silicon was added to counteract acid attack.

2-69. Ingot Mold Usage. (Concluded.) N. H. Bacon. *Iron and Steel,* v. 20, March 1947, p. 89-92.

The value of statistical methods in its study.

2-70. Recent Developments in Steelmaking. J. A. Kilby and W. G. Cameron. *Engineering,* v. 163, March 21, 1947, p. 209.

Blast-refining, electric-furnace, and openhearth processes; the effect of nitrogen, furnace design, materials handling, scrap-pig ratio. (Condensation of paper presented to the Institution of Engineers and Shipbuilders in Scotland, Feb. 4, 1947.)

2-71. Production of Alumina by the Lime-Soda Process. Part III. W. E. Prytherch, M. L. R. Harkness and W. D. Spencer. *Chemical Age*, v. 56, March 22, 1947, p. 339-343.

The literature on the various alkaline, acid, and miscellaneous processes. 25 ref. (To be continued.)

2-72. Basic Electric Steel, Single Slag Process. M. V. Healey and R. W. Thomas. *American Foundryman*, v. 11, April 1947, p. 100-103.

In the comparison of molybdenum alloy sand castings of basic openhearth and basic electric steel, it was noted that the basic openhearth product has certain desirable metallurgical characteristics that are absent in the basic electric product made by the double slag process. Improvement in basic electric steel was accomplished by thorough boiling and elimination of the reducing slag.

2-73. Basic Slags and Dephosphorization. Part II. Frank Norris. *Industrial Heating*, v. 14, April 1947, p. 606, 608.

Molten basic openhearth slags; fixation of phosphorus and reversion; estimation of phosphorus content, rephosphorization of metal during casting.

2-74. Carbothermic Process for Magnesium at Permanente. A. C. Byrns. *Chemical Engineering Progress* (Transactions Section), v. 43, April 1947, p. 172-173.

The process used and the plant of Permanente Metals Corp. described. Essential feature is the reduction of MgO by carbon to give a mixture of Mg vapor and CO.

2-75. Coke and Iron Practice in Utah. C. L. Waggoner. *Steel*, v. 120, April 21, 1947, p. 112-114.

How better quality coke is produced from coal farther away from outcrop. Yield of coke from Utah coals is 67%. Mixing iron ore faces at mine and bedding system at plant serve to maintain spread of magnetite content to about 4%. Blast pressures from 16 to 18 psi. are employed.

2-76. Metallothermy and the Electrochemical Series. I. I. Iskoldsky and T. G. Shokhor. *Journal of Applied Chemistry (U.S.S.R.)*, v. 19, no. 7, 1946, p. 693-703. (In Russian.)

Attempts were made to apply the thermite reaction to a number of different metal-oxide combinations. Reactions using beryllium and iron, respectively, to reduce oxides, were successful. Metals, intermetallic compounds, and salts are the final products of thermite-type reactions. A relationship exists between the heats of the reduction reactions and the electromotive series. This confirms the ionic character of thermite reactions.

2-77. Electrolytic Separation of Zirconium. V. A. Plotnikov and E. B. Gitman. *Journal of Applied Chemistry (U.S.S.R.)*, v. 19, no. 8, 1946, p. 826-832. (In Russian.)

A new method of electrolytic separation of zirconium in coarse-grained powder form. Such zirconium powder may be used in production of zirconium alloys of various compositions.

2-78. Aluminum From a Fused Chloride Bath. Colin G. Fink and Dushyant N. Solanki. *Electrochemical Society Preprint 91-15*, 1947, 15 p.

The problem of a container and of a cathode for melting and electrolyzing a fused mixture of $AlCl_3$ and NaCl. Of the commoner materials tried—porcelain, graphite, porous carbon, iron and nickel—the last was highly satisfactory. Influence of the following factors: the relative proportions of $AlCl_3$ and NaCl; the electrode spacing; the current density at the cathode; bath temperature; duration of electrolysis; added salts; and the substitution of NaCl by other chlorides such as LiCl, KCl and $CaCl_2$.

2-79. Recent Developments on the Preparation of Zirconium. W. C. Lilliendahl and H. C. Rentschler. *Electrochemical Society Preprint 91-16*, 1947, 9 p.

A general survey of contemporary work. Experimental equipment for the production of rare metals in general. A detailed study of the reaction: $ZrO + 2Ca \rightarrow Zr + 2CaO$. The relation of excess reducing agent and addition agents to residual impurities in the metal product, and the effect of these impurities on sintered and melted compacts. By control of the above variables, relatively soft, easily machinable zirconium compacts can be prepared. Some physical properties of the metal.

2-80. Specially Processed Silicon Carbide as a Deoxidizing Agent in the Reducing Slag of Basic Electric Steelmaking. E. A. Loria, H. D. Shephard, and A. P. Thompson. *Electrochemical Society Preprint 91-18*, 1947, 10 p.

The presence of granular silicon carbide in the slag during the finishing period is desirable for it effects the reduction of metallic oxides in the slag and the desulphurization of the bath. Properties of the silicon carbide slag in relation to the ordinarily used calcium carbide and silicon slags. The method of addition and the benefits attained in double slag practice,

single slag reduced, and alloy recovery. Ability of silicon carbide to desulphurize the bath is considered from the standpoint of slag volume, fluidity, temperature, and the dissociation of the compounds.

2-81. Recent Developments in Steelmaking. J. A. Kilby and W. G. Cameron. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 90, March 1947, p. 408-442; discussion, p. 442-448.

An extensive review of British developments illustrated with graphs and tables. 12 ref.

2-82. Vacuum Dezincing in Lead Refining. W. T. Isbell. *Metals Technology,* v 14, April 1947, T. P. 2138, 4 p.

New high-vacuum technique for removing the 0.5 to 0.6% zinc which remains after desilverization by the Parkes process. The previous process of oxidation in a reverberatory furnace resulted in loss of zinc, and a considerable quantity of lead was converted to oxide in the form of dross and fume.

2-83. Evidence of Formation of Copper Ferrite From Reaction Between Cuprous Oxide and Copper Reverberatory Slags. Pei-yung Huang and Carle R. Hayward. *Metals Technology,* v. 14, April 1947, T. P. 2140, 19 p.

The first experimental evidence of the above phenomenon.

2-84. Effect of Length of Cycle on the Economics of Retort Zinc Smelting. B. M. O'Harra and F. G. McCutcheon. *Metals Technology,* v. 14, April 1947, T. P 2156, 9 p.

The economics of 24 and 48-hr. cycles as influenced by various factors. Intermediate-length cycles are ruled out because cleaning and recharging would sometimes occur during the heat of the day.

2-85. Copper Phosphide From a Crucible. S. A. Hasik. *Engineers' Digest (American Edition),* v. 4, April 1947, p. 157.

A crucible method for producing copper phosphide, for use as an alloying material in the bronze foundry, from commercial red copper and red phosphorus. (Condensed from *Vestnik Mashinostroenia,* no. 2 and 3, 1946, p. 75-76.)

2-86. Electrical Features of a Modern Hot Metal Mixer Installation. W. A. Mosteller and L. R. Milburn. *Iron and Steel Engineer,* v. 24, April 1947, p. 65-69; discussion, p. 69-70.

The electrical features of a new mixer installed at the Great Lakes Steel Corp. plant in Ecorse, Mich.

2-87. Desulphurization and Dephosphorization of Molten Cupola Iron and Pig Iron in Basic-Lined Ladles. *Foundry Trade Journal,* v. 81, April 3, 1947, p. 259-267.

Recent experience with the desulphurization of molten metal in the ladle using soda ash. Experimental work on ladle treatment to obtain dephosphorization.

2-88. Steelmakers Weigh Oxygen Possibilities. *Iron Age,* v. 159, May 1, 1947, p. 50-53, 133.

A.I.M.E. openhearth and blast furnace conference highlighted by discussion of oxygen use for combustion and carbon reduction. High top pressures, raw materials, refractory improvements. An abstract of McKune award paper, "Direct Oxidation".

2-89. Adapts Pilot Plant to Manufacture of Alloy Steel. W. W. Stephens and J. L. Morning. *Steel,* v. 120, May 5, 1947, p. 116, 119-120, 122.

Low-cost power generated at Shasta Dam, Calif., is utilized to test recently developed techniques for economical production of special alloy steels utilizing iron, chromium, manganese, and nickel ores found on the West Coast.

2-90. Steelmaking. R. H. Pullen. *Iron and Steel,* v. 20, April 1947, p. 129-131.

Practice in fixed-type basic openhearth furnaces discussed under headings of *(a)* charging and subsequent melting of the charge, *(b)* refining the charge, and *(c)* tapping the refined steel.

2-91. German Production Methods. *Iron and Steel,* v. 20, April 1947, p. 139-141.

Wartime practice in the manufacture of sheet and plate, including the alloy situation, especially as applied to rolled armor plate. The successful use of low-grade German ores, potentially makes Germany independent in this raw material. Efforts to upgrade basic converter steel especially for use as cold rolled sheets. Factors in German markets and labor rates which retarded the installation of high-production mills for plates and sheets.

2-92. The Effect of Temperature on the Phosphorus Reaction in the Basic Steelmaking Process. K. Balajiva and P. Vajragupta. *Journal of the Iron and Steel Institute,* v. 155, April 1947, p. 563-567.

Following the previous laboratory investigation of the phosphorus reaction in the basic steelmaking process at 1585° C., the work has been extended to two other temperatures—1550° C. and 1635° C.—employing a series of slags of varying lime content and with compositions covering the normal range of basic practice. In addition to the experimental technique already described, an X-ray examination of the rapidly quenched slags obtained in the present work has been carried out, and the results confirm the findings regarding the constitution of basic slags previously reported at 1585° C.

2-93. Fluidity of Furnace Killed Vs. Ladle Killed Basic Openhearth Heats. Daniel J. Murphy. *Blast Furnace and Steel Plant,* v. 35, May 1947, p. 558-559.

Experience at Scullin Steel Co. showed that fluidity can be obtained either by excessive temperatures or by letting the heat "liven up" a little or "come back" before tapping.

2-94. Steel-Melting Practice. Charles H. Herty, Jr. *Metal Progress,* v. 51, May 1947, p. 747-751.

Trends in steel production and ways whereby output may be increased through improvements in mechanisms and quality and form of the raw materials.

2-95. Antimony Smelting. *Metal Industry,* v. 70, May 2, 1947, p. 308.

German production methods are at the stage of the very early days of antimony smelting in England. (Based on a report made by the British Intelligence Objectives Subcommittee.)

2-96. Duplexing Low-Carbon Alloys. E. S. Renshaw and T. Foley. *Iron Age,* v. 159, May 22, 1947, p. 56-59.

The production of iron in the 1.20 to 1.45% C range in a duplexing setup involving a basic cupola and an acid electric furnace. This arrangement, designed to provide 180,000 lb. of hot metal per 9-hr. shift for the continuous pouring of automotive parts, is said to result in a high degree of uniformity of composition and temperature and in a sulphur maximum of 0.08%. An unusual chute arrangement for charging the electric furnace and the use of acid monolithic hearths and water-cooled roofs.

2-97. A Statistical Method and Results of a Study of Factors Affecting Openhearth Production Rate. A. P. Woods and C. R. Taylor. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 15-31.

Results of use of a punched-card technique for the study of 20 variables.

2-98. Effect of Charging Rate on Production. Vernon W. Jones. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 32-35; discussion, p. 35-41.

Investigation conducted at American Rolling Mill Co.

2-99. Limestone and Lime of Openhearth Quality. D. E. Washburn. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 44-46; discussion, p. 46-47.

Effects of different compositions and of sizing.

2-100. Limestone Solution in the Basic Openhearth Furnace. Michael Tenenbaum and J. S. Griffith. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 47-56.

Information on the mechanism of limestone solution from data obtained in a petrographic study of lime lumps removed from the openhearth furnace during the period following the addition of hot metal.

2-101. Desulphurization of Pig Iron by Addition of Soda Ash. C. L. Labeka. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v 29, 1946, p. 56-58; discussion, p. 58-60.

Techniques used at Pittsburgh Steel and results obtained.

2-102. Substitution of Coke for Pig Iron in Openhearth Charge. Oliver P. Luetscher. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 60-64; discussion, p. 64-65.

Results of a study which included evaluation of several variables such as charge composition and sulphur content of the coke.

2-103. Some Factors Affecting Excess Air Requirements in the Melting Chamber. M. Tenenbaum and J. M. Brashear. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 121-132.

Continuous recording of oxygen in waste gases made possible the analysis of combustion characteristics and air requirements throughout a number of openhearth heats. Primary factors affecting the oxygen content for any given furnace are shown to be proportion of fuel and air, furnace pressure, and excess air required to burn the products of bath reactions.

2-104. Practical Aspects of Desulphurization. H. B. Emerick, T. E. Brower, Philip Schane, Jr., and C. T. Scott. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 146-151.

Individual comments of representatives of Jones and Laughlin Steel Corp., U. S. Steel, Carnegie-Illinois and Bethlehem Steel.

2-105. Influence of Operating Variables on Ladle Reactions in Low-Carbon Rimmed Steel (0.10% Carbon or Under). P. W. Nutting and C. C. Brown. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 152-157; discussion, p. 157-161.

The variables of operating practice in the openhearth and some basic statistical data regarding the conditions that accompany ladle reactions.

2-106. Oxygen in Liquid Openhearth Steel—Oxygen Content During the Refining Period. T. E. Brower and B. M. Larsen. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* p. 162-176; discussion, p. 176-186.

A study of oxygen content of a large number of liquid steels in the furnace and of activity of oxygen in the slag, when a steady state is approached—this being usually near the end of the refining period.

2-107. Grain-Growth Inhibitors in Steel. James W. Halley. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 187-197; discussion, p. 198-200.

An investigation of the effects of some of the more common grain-growth inhibitors used in production of fine-grained steels.

2-108. Openhearth Practice to Meet Hardenability Requirements. A. G. Forrest and J. V. Russell. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 200-206.

Effects of composition and residual alloys and of deoxidation on hardenability as determined by the Jominy and "S.A.C." tests.

2-109. Melting to Hardenability. Elliott A. Reid. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 211-214.

System by means of which openhearth operators aim to obtain a specified hardenability, rather than a specified composition. To do this, a table of hardenability factors corresponding to the amounts of the elements found in carbon and alloy steels has been established, based on the logarithms of the Grossmann factors.

2-110. Summary of Questionnaire on Deoxidation of Semikilled Steel. M. Tenenbaum. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 222-226.

Following features of deoxidation practice on structural and plate grades of semikilled steels are covered by replies from 29 plants: manganese and silicon analysis of three selected carbon ranges; weight and timing of bath additions; weight of ladle additions; mold size and ingot weight; weight and timing of mold additions; and alloy analysis.

2-111. Use of Electrolytic Manganese. F. T. Sisco, R. H. Isenberg, J. F. Pollack, and L. A. Lambing. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 226-228.

Experience at Bureau of Mines, Pittsburgh Steel, and Jones and Laughlin Steel using electrolytic manganese in steelmaking.

2-112. Effect of Temperature on Cleanliness, Macrostructure, Microstructure and Grain Size. J. F. Pollack, R. H. Isenberg, and A. H. Jolly. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 243-248.

Effect as investigated at Jones and Laughlin, Pittsburgh Steel and Wisconsin Steel.

2-113. Molds and Pouring Practice. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 248-249.

Ingot-mold design and mold coatings.

2-114. Technique for Improving Low-Carbon Killed Steel of Carburizing Grades. L. W. Fleming. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 255-257; discussion, p. 257-261.

Probable causes of poor surface and internal quality and possible methods for minimizing them. The principal factors found to be of importance were: selection of raw materials; melting and working; finishing and deoxidation; sulphur content; pouring practice and mold design; and soaking-pit practice.

2-115. Carburized, Tarred and Special Nozzles. J. L. P. McMahon and E. C. Hite. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 292-293; discussion, p. 293-294.

Experience with steel-pouring nozzles of different types at Pittsburgh Steel and Timken Roller Bearing Co.

2-116. Control of Acid Openhearth Heats Through Measurements of Slag Fluidity. James W. Linhart. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 299-308; discussion, p. 308-313.

The history of slag-fluidity testing and details of the fluidimeter developed by the Acid Open Hearth Research Assoc. An investigation of the use of this instrument for the control of low-carbon heats.

2-117. Use of Special Deoxidizers. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 316-319.

Ferro-Carbo and ferrotitanium as steel-melting deoxidizers.

2-118. Den Elektriska Stalugnens Utveckling Under Världskriget 1939-1945. (Development of Electric Smelting Fur-

naces During the War Years.) *Jernkontorets Annaler,* v. 131, March 1947, p. 75-102.

Discussion by the technical commission of Jernkontorets of Erik Sunström's report concerning the development of electric smelting furnaces published in v 130, 1946, p. 477-552.

2-119. **Blast Furnace Bell Development.** Truman H. Kennedy. *American Iron and Steel Institute Preprint,* 1947, 12 p.

Development of a serrated-type bell at National Tube Co., McKeesport, Pa., to secure better charge distribution.

2-120. **A Method of Estimating Blast Furnace Production and Coke Consumption.** W. E. Marshall. *American Iron and Steel Institute Preprint,* 1947, 26 p.

An empirical method for calculating coke burned at the tuyeres per ton of pig iron without making use of oxygen blown per ton of iron produced. This figure is divided into the coke equivalent to the oxygen blown per day to give a good estimate of production.

2-121. **Spectrographic Control of the Converter Blow.** S. T. Jazwinski. *Iron Age,* v. 159, May 29, 1947, p. 50-57.

Attempt is made to correlate the end point with the disappearance of certain spectrum bands, in side-blown Tropenas converter operation, and to predict the composition of the bath and the temperature during a blow by the atomic spectrum. New concepts of converter metallurgy developed during wartime research in England.

2-122. **Direct Oxidation.** E. B. Hughes. *Blast Furnace and Steel Plant,* v. 35, June 1947, p. 677-686.

Results of a series of experimental heats in which oxygen was used for refining low-carbon heats at the Steubenville Works of Wheeling Steel Corp. Oxygen at 100 psi. was introduced into the bath by a pipe through the wicket hole. The chief advantages were a saving in time of heat and a saving in fuel. The fuel saving alone was sufficient to pay for the oxygen. (Presented at Conference of the National Open Hearth Committee of the A.I.M.E., Cincinnati, April 22, 1946.)

2-123. **The Operation of Openhearth Furnaces With Coke Oven Gas. Part II.** D. Kilby. *Blast Furnace and Steel Plant,* v. 35, June 1947, p. 707-713.

Warming-up furnace, working charge, removal of slag from the slag pockets. Factors governing smooth operation. Complete histories of samples of 0.06% C rimming steel, free-cutting steel and forging quality 0.29 to 0.32% C steel. (Paper read at meeting of Iron and Steel Institute of Great Britain.)

2-124. **Developments in the Use of Blast-Furnace Gas at the Port Kembla Steelworks.** H. Escher. *Journal of the Iron and Steel Institute,* v. 156, May 1947, p. 1-27.

A large number of gas producers have been shut down, and relatively inefficient producer-fired steel furnaces have been converted to firing with by-product fuels. This has resulted in substantial improvements in steelworks practice.

2-125. **The Reduction of Arsenic Trioxide by Carbon and Carbon Monoxide.** R. C. Vickery and R. W. Edwards. *Metallurgia,* v. 36, May 1947, p. 3-6.

Investigation shows that yield of metallic arsenic, by the reduction of arsenic trioxide with carbon, does not approach that indicated by theory. It is suggested that this is caused by the difference in specific heats and vaporization temperatures of the two components, and that the replacement of arsenic trioxide by arsenic compounds of lower vapor pressures may have some effect upon the yield.

2-126. **Effect of Nozzle Size on Surface Quality.** C. J. Hunter. *Iron and Steel Engineer,* v. 24, May 1947, p. 82.

In a 2 to 4-in. range of nozzle sizes, slab-surface qualities of the grades studied improve as nozzle sizes and pouring speeds are increased when teeming into molds of comparatively large cross-sectional area. (Abstract of paper presented before A.I.M.E., Cincinnati, Ohio, April 1947.)

2-127. **Heat Problems in the Steel Industry.** Victor Paschkis. *Iron and Steel Engineer,* v. 24, May 1947, p. 83-87; discussion, p. 87.

How to use the electrical analogy method in the solution of many heat flow problems in the steel mill which cannot be conveniently solved by other methods. Heat flow in melting furnaces, ingot solidification, soaking pit and reheating; heat flow analysis. 13 ref.

2-128. **Oxygen Content of Liquid Steel.** *Industrial Heating,* v. 14, May 1947, p. 778-780.

Summarizes papers by C. E. Sims, of Battelle Memorial Institute, and J. H. Richards, of Carnegie-Illinois Steel Corp., presented at recent conference of the National Open Hearth Committee of A.I.M.E.

2-129. **Melting Semikilled Steel in the Basic Electric-Arc Furnace.** *Industrial Heating,* v. 14, May 1947, p. 782.

An experimental melting program on semikilled steel, conducted in 70-ton basic electric furnaces at the South Chicago plant of Republic Steel Corp. A single-slag process was developed which provides a method of charging for fast melting; tapping without blocking, with all additions to the ladle; and pouring in open-top molds.

2-130. Titanium. *Metal Industry,* v. 70, May 16, 1947, p. 363-364.

Three German methods of production. (From a recent B.I.O.S. report.)

2-131. Blast Furnace Practice Under High Pressure Operation. J. H. Slater. *Steel,* v. 120, June 9, 1947, p. 102-104, 106.

Necessary changes in construction and in operating methods.

2-132. Basic Steelmaking. K. Balajiva and P. Vajragupta. *Iron and Steel,* v. 20, May 23, 1947, p. 276-277.

Previous work on the effect of temperature on the phosphorus reaction at temperatures of 1585 ± 10° C. was extended to other temperatures within the range of normal basic steelmaking practice—that is from 1550 to 1635° C. Results indicated that the empirical relationship previously established between total lime content of the slag and phosphorus equilibrium constant is valid over the entire range. X-ray examination of slags obtained also confirms previous conclusions concerning constitution of basic slags.

2-133. Lithium Metal. Laboratory Preparation by Vacuum Metallurgy. W. J. Kroll and A. W. Schlechten. *Metal Industry,* v. 70, May 30, 1947, p. 395-398.

Present methods of preparing lithium. Advantages which would result from vacuum method. Thermal reduction and reducing agents. Production and reduction of lithium oxide, lithium carbonate, lithium chloride and lithium fluoride. (From a paper recently presented before the A.I.M.E.) 10 ref.

2-134. Production of Alumina by the Lime Soda Process. Part V. W. E. Prytherch, M. L. R. Harkness, and W. D. Spencer. *Chemical Age,* v. 56, May 31, 1947, p. 717-720.

Removal of silica from alumina and its solutions. (Concluded.)

2-135. Symposium on Radiant Energy and Gaseous Reaction. Part II. *Industrial Heating,* v. 14, June 1947, p. 909-912.

Reviews paper by A. J. Fisher on relation of flame character to open-hearth operation, presented at recent American Institute of Chemical Engineers' meeting in Pittsburgh. A theoretical discussion of the various components making up total flame radiation, and a practical discussion of the need and the ways and means of controlling flame radiation in the open-hearth furnace.

2-136. Rate of Reduction of Geneva Iron Ore. John R. Lewis. *Metals Technology,* v. 14, June 1947, T.P. 2177, 15 p.

Apparatus and procedures devised for study of the above on a laboratory scale. Accurately ground cubes of iron ore were reduced in a stream of hydrogen passing through a laboratory tube furnace.

2-137. Laboratory Preparation of Lithium Metal by Vacuum Metallurgy. W. J. Kroll and A. W. Schlechten. *Metals Technology,* v. 14, June 1947, T.P. 2179, 9 p.

Lithium metal was produced readily by the reduction of Li_2O and CaO mixtures with silicon or aluminum in a vacuum of less than one micron and at temperatures of 950 to 1000° C. Magnesium-lithium alloys can be made by reducing Li_2O and CaO mixtures with magnesium at 950° C. It appears that lithium is produced more easily by vacuum methods than is magnesium, barium, calcium, or strontium. The laboratory methods described could be used with little modification for the commercial production of this metal of outstanding purity. 10 ref.

2-138. Experimental Laboratory Study on Effect of Pressure on Carbon Deposition and Rate of Reduction of Iron Oxides in the Blast Furnace Process. L. F. Marek, A. Bogrow, and G. W. King. *Metals Technology,* v. 14, June 1947, T.P. 2184, 24 p.

Data and an interpretation of the results of a laboratory study of the above. Effort was made to approximate the conditions prevailing in commercial blast furnaces.

2-139. Oxygen in Basic Electric-Furnace Baths. S. F. Urban and G. Derge. *Metals Technology,* v. 14, June 1947, T.P. 2185, 15 p.

Heat records including oxygen analyses in addition to slag and metal analyses were assembled and examined for 30 electric-furnace steel heats. Available methods of sampling for oxygen are compared. 10 ref.

2-140. Iron and Steel Manufacture. Ralph W. Farley. *Metal Progress,* v. 51, June 1947, p. 972-975.

Reviews papers presented at Cincinnati conference of the Open Hearth, Coke Oven, Blast Furnace, and Raw Materials Committees of the American Institute of Mining and Metallurgical Engineers, April, 1947.

2-141. Oxygen Firm Outlines Its Research Program for Steelmaking Applications. *Iron Age,* v. 159, June 12, 1947, p. 109-110.

Summarizes information released by Linde Air Products Co.

2-142. Oxygen Jet Speeds Openhearth Steel Output. *Iron Age,* v. 159, June 19, 1947, p. 75-76.

Device consists of a central oxygen supply pipe surrounded by two concentric water-cooled passages. It cuts down exposed portions of scrap rapidly, producing a small amount of superheated molten scrap steel, and clears a path for the main burner flame, increasing the charge area exposed, thus improving over-all heat transfer. Thus

meltdown time and decarburization time are reduced. Results are superior to those obtained with lances.

2-143. What About the Use of Oxygen in Steelmaking? John D. Knox. *Steel,* v. 120, June 23, 1947, p. 107-108, 144, 146.

Four methods employed for decreasing the melting period. Oxygen burner practice reduces charge-to-tap time from 10 to 25% and yields better control of slag temperature. Auxiliary burners promise reductions in charge melting time. Evaluation of results.

2-144. Some Factors in the Reduction of the Iron Content of Magnesium-Base Alloys. F. A. Fox, C. J. Bushrod, and S. E. Mayer. *Magnesium Review and Abstracts,* v. 6, Oct. 1946, p. 109-111. (Reprinted from *Journal of the Institute of Metals,* v. 73, no. 2, 1946.)

To be concluded.

2-145. Fundicao de Aco. (The Casting of Steel.) Ferrucio Fabriani. *Boletim da Associacao Brasileira de Metais,* v. 3, April 1947, p. 297-302.

Problems in casting steel ingots with particular attention to eliminating defects in the castings.

2-146. Um Metado Geral Para Caiculo das Cargas de Fornos de Chumbo. (A General Method of Calculating the Charges for Lead Furnaces.) Tharcisio D. de Souza Santos. *Boletim da Associacao Brasileira de Metais,* v. 3, April 1947, p. 303-318.

Charges for furnaces to reduce sintered compacts or lead ores. A method for solving the problems which arise in reducing plants.

2-147. Silicon Carbide. E. A. Loria, H. D. Shephard, and A. P. Thompson. *Iron and Steel,* v. 20, June 1947, p. 317-318, 320.

Use as a deoxidizing agent in basic electric steelmaking. (From a paper presented to the Electrochemical Society.)

2-148. Talks About Steelmaking. Harry Brearley. *British Steelmaker,* v. 13, June 1947, p. 290-293.

Segregation.

2-149. What About the Use of Oxygen in Steelmaking? John D. Knox. *Steel,* v. 120, June 30, 1947, p. 86-88, 90, 92.

Improved procedure in use of lances greatly extends life of steel pipe. Smoke elimination is achieved by various methods. Furnace performance is affected largely by purity of oxygen.

2-150. Teaching the Blast Furnace New Tricks. C. H. Vivian. *Compressed Air Magazine.* v. 52, July 1947, p. 162-166.

Republic's work on pressure-blowing.

2-151. Notes on Swedish Acid Openhearth Practice. S. M. Wejle. *Iron Age,* v. 160, July 3, 1947, p. 67-68.

Factors which help produce a superior quality steel.

2-152. Effect of Sized and Nodulized Mesaba Iron Ores on Blast Furnace Performance. Herman F. Dobscha. *Skilling's Mining Review,* v. 36, July 5, 1947, p. 1-2, 4, 6, 13.

Blast furnace tests conducted at Edgar Thomson works of Carnegie-Illinois Steel Corp. showed distinctive advantages in increasing iron production and decreasing fuel consumption when using prepared iron ores. It is believed that an ultimate production rate in excess of 1700 tons of iron per day could be maintained. The test also revealed the excellent iron-production and fuel-economy potential of large, modern blast furnaces and indicated the desirability of providing adequate blowing capacity when operating on a burden composed of prepared ores and coke made from washed coals.

2-153. Flaking in Alloy Steels. S. W. Poole. *Iron Age,* v. 160, July 17, 1947, p. 42-46.

Fundamental causes for this condition and means by which it can be minimized. Operating data indicating heat treating cycles that have given successful results. Test methods for flakes in billets and blooms, including use of the Reflectoscope.

2-154. Low Cost Oxygen for Metallurgical Uses. Walter E. Lobo. *Iron Age,* v. 160, July 17, 1947, p. 49-55.

How equipment and techniques perfected largely for military use during the war promise to make available the necessary quantities of oxygen at costs substantially lower than present levels.

2-155. Critical Points. Mainly About Metallurgical Oxygen. *Metal Progress,* v. 52, July 1947, p. 67-70.

Growth of the oxygen business; use in blast furnaces, openhearths and electrics; type of plant to furnish oxygen for 10-furnace steel mill.

2-156. Economics of Oxygen Use in Steelmaking Furnaces. *Blast Furnace and Steel Plant,* v. 35, July 1947, p. 813-816.

Linde Air Products' tabular summary of openhearth heats using oxygen through end-burners.

2-157. The Use of Carbon in the Blast Furnace and Heat Balances. T. L. Joseph and Kurt Neustaetter. *Blast Furnace and Steel Plant,* v. 35, July 1947, p. 824-832.

Fundamental principles; functions. Gasification at and above the tuyeres; volume of blast per pound of coke; fuel consumption; effect of low grade ores; and limiting factors in furnace efficiency, hearth temperatures, or reducing power (To be continued.)

2-158. Symposium on Radiant Energy and Gaseous Reaction. Part III. *Indus-*

trial Heating, v. 14, July 1947, p. 1104, 1106, 1108.

Reviews last two papers of American Institute of Chemical Engineers Symposium recently held in Pittsburgh. The operation of an experimental openhearth and radiant principles as applied to the measurement of temperature and flame characteristics. (Concluded.)

2-159. Acid Electric Furnace Practice. *Industrial Heating,* v. 14, July 1947, p. 1124, 1126, 1128, 1130.

The chemistry of the acid electric furnace process by C. E. Sims, supervising metallurgist, Battelle Memorial Institute, Columbus, Ohio, which was a feature of the technical program of the Fourth Annual Electric Furnace Steel Conference of the Iron and Steel Division of the A.I.M.E. in Pittsburgh.

2-160. Ingot Mold Practice Throughout the Steel Industry. *Industrial Heating,* v. 14, July 1947, p. 1132, 1134.

Results of a survey on mold practice made throughout the steel industry as presented by L. R. Berner, Inland Steel Co., at recent conference of the National Open Hearth Steel Committee, A.I.M.E., Cincinnati.

2-161. Etude de la Desoxydation de l'Acier par Fusion dans le Vide. (Study of Deoxidation of Steel by Vacuum Smelting.) J. Thomas and L. Moreau. *Revue de Metallurgie,* v. 43, July-Aug. 1946, p. 204-207.

The vacuum causes rapid reaction of the carbon in the melt with the refractory liners. It is tentatively assumed that a similar reaction must occur with the oxides of the bath itself.

2-162. Etude sur l'Eclatement des Minerais de Fer dans le Haut Fourneau et ses Consequences. (Study of Spontaneous Fragmentation of Different Iron Ores in Blast Furnaces and Its Consequences.) M. J. Fortado. *Revue de Metallurgie,* v. 43, July-Aug. 1946, p. 219-228.

Specially designed apparatus used in investigation. Results indicate the importance of the phenomenon in iron smelting.

2-163. Reduction of Nickel Oxides by Solid Carbon in Connection With Processes of Their Dissociation. D. Bogatsky. *Bulletin of the Academy of Sciences of U.S.S.R. (Section of Technical Sciences),* no. 1, 1947, p. 105-112. (In Russian.)

Data concerning the above reaction, particularly from the theoretical point of view, are contradictory. Therefore, an investigation was conducted to determine: temperature of initiation of reduction; dependence of the kinetics of the process on its temperature and duration; and optimum conditions for practically complete reduction. 25 ref.

2-164. Reduction of Nickel Silicate Minerals by Carbon Dioxide. D. P. Bogatsky. *Journal of Applied Chemistry (U.S.S.R.),* v. 20, no. 1 and 2, 1947, p. 81-88. (In Russian.)

Results of experiments. Data show optimum conditions.

2-165. The Theory of Continuous Ingot Casting. A. N. Tikhonov and E. G. Shvidkorsky. *Journal of Technical Physics (U.S.S.R.),* v. 17, no. 2, 1947, p. 161-176. (In Russian.)

A theoretical calculation of the shape and size of the zone of crystallization dividing molten from solid metal; an analysis of the effects of various physical factors.

2-166. L'Aluminothermie. (Aluminothermy.) H. C. Gonon. *Revue de l'Aluminium,* v. 24, April 1947, p. 117-120.

The aluminothermic method of oxide reduction and its application in the production of a series of high-purity metals. Other technical applications of aluminothermy.

2-167. Zur Kenntnis der Carbide des Magnesiums. (Contribution to the Study of Magnesium Carbide.) F. Irmann and W. D. Treadwell. *Helvetica Chimica Acta,* v. 30, April 30, 1947, p. 775-777.

Magnesium carbide, unlike other earth alkali carbides, can be formed from the elements only by the action of hydrocarbons. At high temperatures free carbon is produced, decreasing the quantity of carbide to zero.

2-168. Problems in Cell Design for Electrolytic Chromium. R. R. Lloyd. *Engineering and Mining Journal,* v. 148, July 1947, p. 95-97.

Process for electrowinning of chromium, applicable to low-grade domestic ores, being developed in laboratories of U. S. Bureau of Mines.

2-169. The Use of Oxygen in the Openhearth Practice for Carbon Reduction. George V. Slottman and F. B. Lounsberry. *American Iron and Steel Institute Preprint,* 1947, 28 p.

A series of experimental heats were made using gaseous oxygen injected directly into the bath to study factors affecting the rate of decarburization. Efficiency factors were calculated for various blowing rates and bath carbon contents. Analyses were made of the oxygen content of the slag. The behavior of manganese with respect to carbon was studied in relation to its effect on the efficiency factor. An equation was derived to cover the experimental data. Tonnage increases of the order of 25% with equal or better steel quality and with an increase in yield are obtained as compared with former slag-metal practice. 18 ref.

2-170. Traitement Metallurgique des Minerais Sulfures Complexes. (Metal-

How introduction of oxygen at point of entry in furnace greatly increases efficiency of fuel-oil ignition and provides new tool for controlling length of flame, its calorific output, and travel, within greater limits.

2-193. Macro-Segregation in Some Alloy Steel Ingots. J. W. Spretnak. *American Society for Metals Preprint No. 25,* 1947. (To be published in *Transactions* for 1948.)

Macro-segregation in six alloy steel ingots was examined, using published allowable errors in the analysis of steel as the criterion in establishing the occurrence of segregation. A considerable variation in the amount of segregation was found. About half the patterns agree with the previously published pattern of positive and negative segregation in killed steel ingots.

2-194. Electric Smelting Points Way to Lower Cost. M. Sem and F. C. Collin. *Engineering and Mining Journal,* v. 148, Aug. 1947, p. 86-90.

The development of electric matte-smelting furnaces for production of copper flotation concentrates in Finland, Norway, Sweden, and the U. S. Methods for recovery of SO_2 which make the process economically attractive.

2-195. Production of Carbon and Alloy Steels by the Side-Blown Converter Process. F. Cousans. *Foundry Trade Journal,* v. 82, July 24, 1947, p. 275-280.

Production of molten metal for subsequent conversion, the conversion process, photo-electric cell control, degree of control, and physical and mechanical properties for alloy steels.

2-196. Discussion on the Blast Furnace of Today. Part I. A Review of Current Furnace Engineering. W. R. Brown. *Journal of the Iron and Steel Institute,* v. 156, July 1947, p. 399-400.

Discussion of papers published in January 1947 issue.

2-197. Use of Sponge Iron in Steel Production. R. C. Buehl, M. B. Royer, and J. P. Riott. *Bureau of Mines Report of Investigation 4096,* July 1947, 74 p.

History and literature review. Test data show that for sponge iron to be a desirable melting stock for acid electric furnaces, it should be low in sulphur and phosphorus. Sponge-iron slabs with a high silica content (about 7%) can be used to replace scrap in a basic openhearth charge to the extent of about 12% of a cold metal furnace charge without any appreciable change in operating procedure or reduction in furnace capacity.

2-198. The Josephtown Electrothermic Zinc Smelter. *Mining and Metallurgy,* v. 28, Aug. 1947, p. 398-405.

Descriptive series includes the following separate articles: An introduction, by H. K. Najarian. Roaster plant, by V. W. Simkins. Acid plant, by V. W. Simkins. Leaching plant, by Karl F. Peterson. Sinter plant, by Karl F. Peterson. Furnace plant, by James M. Brabec. Zinc oxide production at the Josephtown smelter, by J. J. Rankin. Shop facilities, by J. R. Kester. Industrial engineering department, by George E. Deeley. Engineering department, by W. B. MacBride. Research and development, by Frank M. Kennedy. The laboratories at the Josephtown smelter, by J. J. Rankin.

2-199. The Herculaneum Smelter. *Mining and Metallurgy,* v. 28, Aug. 1947, p. 377-382.

Various phases of the production of chemical and corroding grades of lead at smelter of St. Joseph Lead Co., Herculaneum, Mo. W. T. Isbell describes the over-all picture; John Sherman, the roasting department; J. O. McLellan, the blast furnaces; Finis Huddleston, the lead refinery; and Clyde Smith, the zinc plant.

2-200. Physical-Chemical Investigations of Oxidized Ferro-Nickel Ores. G. G. Urazov and D. P. Bogatzky. *Comptes Rendus de l'Academie des Sciences de l'U.R.S.S.* v 56, no. 1, 1947, p. 61-63. (In English.)

A study of ore behavior during calcining and reduction, as a basis for suggested new methods of chemical-metallurgical processing shows the scheme of reduction. Possibility of selectively obtaining nickel from the oxide minerals by reduction of oxidized ferronickel ores.

2-201. Factors Retarding the Blast Furnace Reaction: $2CO = C + CO_2$. I. Chufarov and M. F. Antonova. *Bulletin of the Academy of Sciences of U.S.S.R. (Section of Technical Sciences),* no 4, 1947, p. 381-389. (In Russian.)

Effect of various poisons on iron oxide used as a catalyst for the reduction of CO. In blast furnace operations this reaction tends to shorten the life of the furnace lining due to interstitial deposition of carbon in the refractories. Sulphates and sulphides are active "poisons", which can retard the breakdown of CO very effectively. 12 ref.

2-202. Blast Furnace Smelting of Titaniferrous Ores With Basic Slags. I. V. Shmanenkov and K. Kh. Tagirov. *Bulletin of the Academy of Sciences of U.S.S.R. (Section of Technical Sciences),* no. 4, 1947. p. 391-397. (In Russian.)

Smelting of ores containing up to 13% TiO_2 in a blast furnace with a 19-in. hearth. Addition of alkali-bearing clays to the burden permitted

smooth operation of the furnace with slags containing 15 to 20% TiO_2 and with ratios between CaO and SiO_2 of 1.2 to 1.25.

2-203. Sur la Reduction de l'Oxyde Titanique par le Calcium et par le Magnesium. (The Reduction of Titanic Oxide by Calcium and Magnesium.) Andre Chretien and Robert Wyss. *Comptes Rendus*, v. 224, June 9, 1947, p. 1642-1643.

Compacts of titanic oxide and finely divided metal (calcium or magnesium) were heated to 1200° for 2 hr. The oxide is reduced to pure titanium when calcium is used, and to TiO when magnesium is used.

2-204. Production of Alumina From Clay by a Modified Pedersen Process. T. P. Hignett. *Industrial and Engineering Chemistry*, v. 39, Aug. 1947, p. 1052-1060.

A lime-sinter modification of the Pedersen process for producing alumina from clay was investigated through operation of a pilot plant with a capacity of 300 lb. of alumina per day. Planning, organization, personnel requirements, operating techniques, collection of data, and chemical control; little emphasis on the process.

2-205. Fume and Dust in Lead Smelting. W. H. Dennis. *Mine & Quarry Engineering*, Aug. 1947, p. 237-242.

Recovery and collection of lead fume and dust.

2-206. Single Slag Basic Electric Heats. M. V. Healey. *Steel*, v. 121, Aug. 25, 1947, p. 104-107.

Process essentially consists of an adequate boil to eliminate the neutral and reducing gases, and then tapping the heat before the gases have an opportunity to return. Grain growth characteristics approaching those of basic openhearth steel are imparted.

2-207. Basic Openhearth Slag Control. Charles R. Funk. *Blast Furnace and Steel Plant*, v. 35, Aug. 1947, p. 939-943.

Functions of basic openhearth slags, the advantages and methods of slag control. (To be continued.)

2-208. The Use of Carbon in the Blast Furnace and Heat Balances. T. L. Joseph and Kurt Neustaetter. *Blast Furnace and Steel Plant*, v. 35, Aug. 1947, p. 944-948.

Purpose of a heat balance is to establish the amount of heat generated per unit of pig iron and to indicate the relative amount consumed in various phases of the process.

2-209. Use of Oxygen in the Openhearth Furnace. *Blast Furnace and Steel Plant*, v. 35, Aug. 1947, p. 949-956.

Construction and testing of a wide variety of special burners and oxygen injection devices, and the study of flame characteristics of burners.

2-210. German Practice in Refining Secondary Aluminum. James T. Kemp. *Light Metal Age*, v. 5, Aug. 1947, p. 8, 11-13.

Airplane scrap; sorting and separation on a sloping hearth; the Beck process; filtration; distillation; three-layer electrolytic process; Schmidt mercury process; Zincal process.

2-211. Dusting in the Copper Smelter. W. H. Dennis. *Mining Magazine*, v. 77, Aug. 1947, p. 78-80. (Concluded.)

Problem of converter dust and its recovery. A pipe-type electrostatic dust precipitator.

2-212. Copper Recovery From Low-Grade Waters. R. W. Toll. *Mining Magazine*, v. 77, Aug. 1947, p. 83-84.

Improved precipitation method in use at Devon Consols Mine has for several years averaged 70% copper.

2-213. Solving a Steel Production Problem. Arnold Hoffman. *Mining and Metallurgy*, v. 28, Sept. 1947, p. 444-446.

Advocates increased sinter production as a means of eliminating the dependence of the steel industry on scrap from outside sources.

2-214. Determination of Reactive Oxygen. *Journal of the Iron and Steel Institute*, v. 156, Aug. 1947, p. 526-528.

Sven Fornander discusses paper by I. M. Mackenzie (no. 2 issue, 1946). Results of carbon and oxygen determination on a few heats made in a basic openhearth furnace indicate that Schenck's formula is not reliable under those conditions. Author's comments.

2-215. Igniter Cuts Fuel Costs. L. M. P. Davison and C. M. Spencer. *Engineering and Mining Journal*, v. 148, Sept. 1947, p. 75-76.

New device for igniting the charge on the Dwight-Lloyd sintering machines in a lead smelter. A saving of 40% of the fuel cost is claimed.

2-216. Producing an Alloying Element of High Purity. W. L. Hammerquist. *Inco Magazine*, v. 21, Summer 1947, p. 24-26.

Equipment and methods used in the production of electrolytic manganese. Wide use is made of nickel and nickel alloys to defeat heat and corrosion.

2-217. Factors Affecting Basic Openhearth Operating Rates. Richard H. Ede. *Steel*, v. 121, Sept. 8, 1947, p. 94, 97, 100, 105.

Use of multiple correlation in obtaining answers to research problems is illustrated by an actual problem in steelmaking. Evaluation of three coefficients affords means of observing effect of feed ore on melt and tap carbons.

2-218. Electric Smelting. R. Durrer. *Iron and Steel,* v. 20, Aug. 1947, p. 389-390.

Possibilities of future development.

2-219. Oxygen-Enriched Blast. R. Durrer. *Iron and Steel,* v. 20, Aug. 1947, p. 390-391; discussion, p. 401-404.

Its use in production of iron and steel.

2-220. Oxygen. M. W. Thring. *Iron and Steel,* v. 20, Aug. 1947, p. 392-393; discussion, p. 401-404.

Possibilities of extended use in the British iron and steel industry.

2-221. New Process for Production of Pure Metallic Tungsten. Hans Bielstein. *Headquarters Air Materiel Command, Wright Field, Dayton, Ohio. Technical Report F-TR-1150-ND,* Aug. 1947, 6 p.

Process described differs from the usual method in two ways: the precipitated tungstic acid is dissolved in ammonia and paratungstate of ammonia is formed; and the paratungstate of ammonia is directly reduced by carbon. The purity of the product is claimed to be improved.

2-222. Vacuum Melting and Casting of Beryllium. A. R. Kaufmann and E. Gordon. *Metal Progress,* v. 52, Sept. 1947, p. 387-390.

Procedures developed for making sound castings which could be used as such or which could serve as extrusion billets. Composition of metal before and after vacuum fusion.

2-223. Economics of the Blast Furnace. B. S. Old, A. R. Almeida, R. W. Hyde and E. L. Pepper. *Iron Age,* v. 160, Sept. 18, 1947, p. 60-69.

Decreases in ore, coal, and coke quality have caused a 10% drop in blast-furnace productivity. Blast-furnace operation with high top pressure, and also operations combining this with beneficiated ores and oxygen-enriched blast should double the output of a furnace. 16 ref.

2-224. Great Lakes Relines Blast Furnace in 44 Days. *Iron Age,* v. 160, Sept. 18, 1947, p. 74-75.

Details of work schedule.

2-225. Phosphorus and Sulphur Equilibria Between Liquid Iron and Slag. *Metallurgia,* v. 36, Aug. 1947, p. 182.

Reviews papers by Winkler and Chipman, and by Grant and Chipman. (*Metals Technology,* v. 13, no. 3, 1946, T. P. 1987 and 1988.)

2-226. Reactions in the Acid Side-Blown Converter. Norman F. Dufty. *Metallurgia,* v. 36, Aug. 1947, p. 179-181.

Recent research and theoretical considerations of the resulting data explain the nature of reactions that occur.

2-227. Application of Slag Control and an Investigation of Basic Openhearth Slags. *Industrial Heating,* v. 14, Sept. 1947, p. 1472, 1474.

Reviews paper by T. Fairley presented before the British Iron and Steel Institute.

2-228. Aluminum-Silicon Alloys. *Metal Industry,* v. 71, Sept. 5, 1947, p. 209.

Methods used in Germany for electrothermic production of Al-Si alloys from alumina and kaolin, and for the subsequent production of silumin alloys. (Abstracted from recent B.I.O.S. report.)

2-229. Copper Refining in the Rotary Furnace. *Mine & Quarry Engineering,* v. 13, Sept. 1947, p. 269-273.

Copper refining in the reverberatory furnace and refining in the rotary furnace as conducted in Europe and especially in Germany.

2-230. Je Mozna Vyroba Zeleza Z Rud Redukci Karbidem Vapniku? (Is the Production of Iron From Iron Ores by Means of Reduction With Calcium Carbide Possible?) Vladimer Uxa. *Hutnické Listy,* v. 1, Nov. 1946, p. 108-109; Dec. 1946, p. 133-137.

Theoretical calculations indicate the possibility. Savings of 20 to 25% are possible in comparison with the electric blast furnaces used in Sweden. Production of excess carbide with water-power-generated electricity would serve as a means for utilization of excess power available during flood conditions. Bauxite lining would be necessary, but the high-quality slag thus produced forms a quick hardening cement. Ferrosilicon is obtained as a byproduct.

2-231. Kotlik na Obohacovani Parkesacnich Stribrnatych Pen. (Special Pot for Enrichment of the Argentiferous Scums From the Parkes Process in the Lead Refinery at Pribram.) Josef Hummel. *Hutnické Listy,* v. 1, June 1947, p. 265-268.

Equipment is diagrammed and described, as well as the proper method for operation of a process by which the silver content of the lead was increased to 64% after distilling off the zinc (as compared with 50% by the previous method). Only one third of the lead-silver alloy remains to be separated by oxidation and melting in the production of silver. Costs are cut in half.

2-232. Factors Which Determine Iron and Steel Making Processes. H. W. Graham. *Metals Technology,* v. 14, Aug. 1947, T.P. 2217, 12 p.

The essential technological elements of the major large-tonnage processes, the interrelationships of these elements and reasons why certain proc-

esses are or are not used. (Henry Marion Howe Memorial Lecture presented at the New York Meeting of A.I.M.E., March 1947.)

2-233. Characteristics of Steel. A. B. Wilder. *Western Metals*, v. 5, Sept. 1947, p. 60, 62-63.

A report to the A.S.T.M. on the effects of steel-mill practice on steel for tubular products.

2-234. Operation of the Iron Blast Furnace at High Pressure. J. H. Slater. *Blast Furnace and Steel Plant*, v. 35 Sept. 1947, p. 1083-1090.

This innovation has been in operation on two furnaces of Republic Steel since Aug. 1946. Iron production has been increased 11 to 20%, coke consumption has been decreased about 13%, and flue-dust production has been cut approximately 30%. The total cost saving is over $1.00 per ton of iron. An extensive description of the process equipment, operation, and results. (Condensed from paper presented at General Meeting of A.I.S.I. New York, May 21-22, 1947.)

2-235. Electrolytic Lead for Research Purposes. A. G. Arend. *Chemical Age*, v. 57, Sept. 6, 1947, p. 325-326, 332.

Methods of production and properties.

2-236. Physical Properties of Steel for Tubular Products. A. B. Wilder. *Steel*, v. 121, Sept. 29, 1947, p. 102, 104, 106, 109, 112.

Fundamental factors in steelmaking which influence impact strength and age hardening characteristics of bessemer, openhearth, and certain electric steels used in tube manufacture.

2-237. Use of Oxygen in Openhearth and Electric Furnaces. William G. Gude. *Foundry*, v. 75, Oct. 1947, p. 74-77, 221-224, 226.

Information and operating data furnished by Linde Air Products Co.

2-238. Blowing High Manganese Metal in a Side-Blown Converter. John Howe Hall. *Foundry*, v. 75, Oct. 1947, p. 85, 232, 234, 236, 238, 240.

Of historical interest. Details of some experimental blows made in a 2-ton converter during 1913 and 1914. The Mn content of the converter charge had been restricted to 0.60% because of violent boiling when the percentage was increased much above this figure. However, it was found that boiling was prevented by increasing the Mn content to about 4%, hence manganese-steel scrap could be utilized.

2-239. Vacuum Process for Preparation of Lithium Metal From Spodumene. R. A. Stauffer. *Metals Technology*, v. 14, Sept. 1947, T.P. 2268, 10 p.

Lithium metal was prepared by reacting a mixture of spodumene, lime, and either ferrosilicon or aluminum in a vacuum furnace. The material produced was not comparable in purity to that produced electrolytically However, attempts at purification, although limited, show that purity may be improved by vacuum distillation Cost analysis indicates possibility of producing the metal more cheaply than by the electrolytic method.

2-240. Structure, Segregation and Solidification of Semikilled Steel Ingots. Michael Tenenbaum. *Metals Technology*, v. 14, Sept. 1947, T.P. 2273, 56 p.

Results of an investigation of the structure and segregating characteristics of a series of experimental semikilled steel ingots. The ingots were made with varied deoxidation under ordinary basic openhearth operating conditions. 18 ref.

2-241. Tantalum Powder by Magnesium Reduction. J. Prieto Isaza, A. J. Shaler, and John Wulff. *Metals Technology*, v. 14, Sept. 1947, T.P. 2277, 5 p.

Production of tantalum pentachloride by passing dried chlorine saturated with CCl_4 over heated tantalite ore concentrate, and the reduction of the salt to tantalum powder in a liquid melt produced by use of KCl as a flux. The method also applied to production of columbium. The powder produced was 100% finer than 9 microns in diameter, which is much finer than the usual electrolytic product.

2-242. The Use of Oxygen in Metallurgical Furnaces. V. A. Mozharov. *Engineers' Digest (American Edition)*, v. 4, Sept. 1947, p. 433-435.

Condensation of a paper and subsequent discussion presented at meeting of Institute of Oxygen of the U.S.S.R. Use of oxygen in openhearth furnaces has not yet become commercial practice in Russia, but her highest authorities have been studying the problem. Topics covered are characteristics of a gas-fired furnace flame (with special reference to a Siemens-Martin furnace), thermal effect of oxygen, practical application to openhearth furnaces, influence of furnace capacity and composition, and scheme of operation using pure oxygen alone. (Translated and condensed from *Kislorod*, no. 1, 1946, p. 1-14.)

2-243. Nottingham Discussion on the Production of Carbon and Alloy Steels by the Side-Blown Converter Process. *Foundry Trade Journal*, v. 83, Sept. 11, 1947, p. 31-33.

Discussion of paper by F. Cousans presented at Annual Conference of Institute of British Foundrymen, Nottingham, England, June 18, 1947 (see July 24 issue).

2-244. Production of High-Strength Steels With Improved Machining Characteristics. F. O. Johnson. *Metal Progress,* v. 52, Oct. 1947, p. 565-567.

How machinability of certain important openhearth steels is improved to a gratifying degree, without any detectable loss in the usual physical test results, by addition of sodium sulphite.

2-245. The Refractory Metal Industry Since 1914. Allan L. Percy. *Metal Progress,* v. 52, Oct. 1947, p. 600-602.

Developments in production of the refractory metals (tungsten, molybdenum, tantalum, and columbium).

2-246. Aluminum-Silicon Alloys by Electrothermal Reduction of Clay With Coke. M. M. Striplin, Jr., and W. M. Kelly. *Chemical Engineering Progress (Transactions Section),* v. 43, Oct. 1947, p. 569-578.

Experimental production of Al-Si alloys containing 25 to 70% Al, 25 to 70% Si, and small percentages of Fe and Ti, by reduction of clay or siliceous bauxite with coke in electric furnaces. Production of the alloys for use in steelmaking and as metallurgical reducing agents is believed to be economically promising. Possible use instead of silicon in aluminum casting alloys and as a starting material for production of aluminum and silicon.

2-247. Engineers Evaluate Use of Oxygen Enriched Air. *Steel,* v. 121, Oct. 13, 1947, p. 96, 98, 100, 103, 106, 108, 110, 113, 124.

Résumés of papers on the above subject, and also on the high top-pressure blast furnace at Cleveland, conditioning of stainless steel, lifting magnet design, soaking-pit operation, the powder process in stainless steel production, and multiple fuel burners for openhearth furnaces. (Presented at A.I.S.E. Meeting, Pittsburgh, Sept. 22-25, 1947.)

2-248. Depolarization With Sulphur-Dioxide-Containing Gases in Electrolytic Extraction of Copper From Sulphate Solutions. V. V. Stender and I. E. Bauslit. *Journal of Applied Chemistry (U.S.S.R.),* v. 20, no. 3, 1947, p. 155-162. (In Russian.)

Details of an attempt to utilize the waste gases from copper refining to decrease the energy consumption (by decrease of anode potential) during electrochemical extraction of copper and to prepare H_2SO_4 by introduction of purified SO_2 into a porous carbon anode during electrolysis. 13 ref.

2-249. Discussion at a Combined Meeting on Side-Blown Converter Practice. *Journal of the Iron and Steel Institute,* v. 157, Sept. 1947, p. 99-114.

Joint meeting of British Iron and Steel Research Assoc. and Iron and Steel Institute, March 20, 1947. Concerned with the converters, their refractories, and their operation.

2-250. Ferrous Metals—Their Production and Properties. S. L. Case. *Metals Review,* v. 20, Oct. 1947, p. 5-7, 45.

Highlights of research and development as reflected in recent technical literature. Ore beneficiation, blast-furnace practice, openhearth process, use of oxygen, properties of steel.

2-251. Products and Processes for the Steel Plant. *Metals Review,* v. 20, Oct. 1947, p. 9, 11, 13, 15, 17, 19.

New production equipment and improved compositions as described by the manufacturers. Ore handling and treatment; oxygen for the openhearth; openhearth, electric, induction melting equipment; refractories; steel plant laboratory equipment. Addresses of manufacturers mentioned.

2-252. Melting High-Speed Steel in the Basic Electric Arc Furnace. H. C. Bigge. *Iron Age,* v. 160, Oct. 10, 1947, p. 118-136.

A comprehensive description of the production of an 18-4-1 heat, including a step-by-step melting procedure. It is correlated with metal analysis, slag analysis, and power requirements. Metal and slag analyses, at seven stages of the heat, and the relationship of these two factors to the color of the respective slag samples. Color photographs of the slag at the seven stages.

2-253. Use of Oxygen in the Openhearth Furnace. Parts II and III. *Blast Furnace and Steel Plant,* v. 35, Sept. 1947, p. 1091-1095; Oct. 1947, p. 1224-1226.

Description of the process, the equipment used, and the results obtained. Effects on shop operating procedures, materials charged, and equipment; and also the effect of oxygen purity on performance.

2-254. Basic Openhearth Slag Control. Parts II and III. Charles R. Funk. *Blast Furnace and Steel Plant,* v. 35, Sept. 1947, p. 1098-1104, 1136; Oct. 1947, p. 1230-1234.

The relationship between the chemical composition of basic openhearth slags and the appearance of the slag pancake sample. Slag composition vs. carbon, phosphorus, and sulphur elimination; also manganese recovery. Data for several heats. (To be continued.)

2-255. Operation of the Iron Blast Furnace at High Pressure. Part II. J. H. Slater. *Blast Furnace and Steel Plant,* v. 35, Oct. 1947, p. 1213-1218.

Condensed from paper read before General Meeting of A.I.S.I., New York, May 21-22.

2-256. Putting the Pressure on Pig. *Enamelist,* v. 24, Oct. 1947, p. 21-23.
Use of pressure blowing in blast furnace operation.

2-257. Synthetic Bauxite. A. V. Hussey. *Chemistry & Industry,* Oct. 18, 1947, p. 635-638, 642-644.
A process for production of synthetic alumina, for use in aluminous cement, from the "red mud" which is a waste product from the Bayer process.

2-258. Fuel Requirements in Steelmaking. *Coke and Gas,* v. 9, Oct. 1947, p. 299-306.
Means of reducing fuel consumption. New processes of steelmaking now under investigation include the manufacture of high-quality bessemer steel by blowing with oxygen and the use of oxygen in the blast and openhearth furnaces, and completion of refining in the ladle at comparatively low temperatures and partial reduction. 12 ref.

2-259. Alloy Billet Grinder Features Oscillatory Head Movement. *Iron Age,* v. 160, Nov. 6, 1947, p. 99-100.
Lower cost, controlled metal removal, and elimination of the human element in grinding are principal features claimed for new automatic billet grinder designed particularly for stainless steel slabs, billets, and similar hot rolled products.

2-260. Oxygen for Decarburization. *Steel,* v. 121, Nov. 10, 1947, p. 126, 128, 141.
Proceedings of annual Southern Ohio Open Hearth Committee, A.I.M.E., meeting in Columbus, Ohio. A new method of charging openhearths and qualities of present-day scrap.

2-261. Electric Smelting of Low-Grade Nickel Ores. S. F. Ravitz. *Bureau of Mines R. I. 4122,* Sept. 1947, 39 p.
Investigation of three deposits in Washington and Oregon containing 1 to 2% Ni and large percentages of iron. Partial reduction results in over 90% recovery as ferronickel containing 25 to 30% Ni. Suitability for preparation of nickel alloy steels such as 18-8 stainless was proven experimentally. Ferronickel containing at least 75% Ni can be produced by oxidation of lower grade material with iron ore or Ni-Fe ore. How a low-carbon steel containing about 2% Cr can be recovered from one of the ores. Estimates of energy and reducing-agent requirements for several possible smelting procedures.

2-262. Solidification of Steel Ingots. Parts III and IV. (Concluded.) J. R. Fleche. *Iron Age,* v. 160, Nov. 6, 1947, p. 92-98; Nov. 13, 1947, p. 94-98.
A mathematical study of the derivation and utilization of K, which is a comparative measure of linear freezing speed; methods of applying K values to steels of various carbon contents. Influence of the various factors involved; mold design from the standpoint of speed of freezing and steel cleanliness.

2-263. Recent Progress in the Metallurgy of Malleable Zirconium. W. J. Kroll and others. *Electrochemical Society Preprint 92-16,* 1947, 15 p.
An improved method of producing zirconium carbide from zircon sand by use of an arc furnace; melting of zirconium metal in graphite crucibles.

2-264. Roheisenerzeugung aus Eisenarmen Moller. (Pig-Iron Production From Low-Grade Iron Ore.) George Bulle. *Stahl und Eisen,* v. 66-67, Feb. 27, 1947, p. 69-78.
Data concerning production of pig iron from low-grade ores which indicate technical feasibility for contents of iron as low as 1%. Conclusions concerning the effects of composition, type of ore additions, required further treatments, fuel consumption, furnace capacities, labor requirements, and over-all costs. German experience to date shows great progress but need for much additional research.

2-265. Die Entwicklung des Basischen Windfrischverfahrens. I. Allgemeine Betrachtung — Vanadingewinnung. II. Herstellung von Manganschlacke. (Development of the Basic Converter Method. Part I. General Considerations; Vanadium Production. Part II. Production of Manganese Slags.) Walter Bading. *Stahl und Eisen,* v. 66-67, April 24, 1947, p. 137-149; May 22, 1947, p. 180-186.
An historical review; results of investigation of vanadium-containing slags, production of V and Si slags; drum converters and rotating-tube furnaces; application of the V-slag method; recovery of V; smelting of spiegeleisen; and phosphorus spiegeleisen and pig iron. The latter were thoroughly investigated on a laboratory scale, and results compared with production data.

2-266. Sur la Préparation de l'Antimoine Métallique par Electrolyse Ignée. (Concerning the Preparation of Metallic Antimony by Fused-Salt Electrolysis.) Georges Weiss. *Bulletin de la Société Chimique de France,* v. 14, May-June 1947, p. 476-478.
Results of a study of the electrolysis of antimony oxide and antimony sulphide in fused sodium borate and sodium phosphate. Yields of antimony for different current densities were determined, as well as variations due to other factors.

2-267. Reduction and Refining. *Engineering and Mining Journal,* v. 148, Nov. 1947, p. 154-162.

Survey of modern developments of several plant procedures and equipments not previously mentioned in the literature, as well as some which have not been too widely recognized. The Dorrco fluosolid process, for roasting or reduction of ores and calcination of limestone is based on reaction of gas with solids in a turbulent suspension (similar to the fluid-catalytic-cracking process for petroleum). Other items include: new materials-handling methods; use of oxygen in roaster, furnace, converter, or fuming plant; reverse leaching of zinc; two-drum filtration; plastic spacers in electrolytic cells; vacuum dezincing and continuous refining of lead; soda treatment of lead drosses; continuous electric melting; new dust-collection methods; reverberatory-furnace improvements; continuous zinc reduction; copper-converter improvements; mercury-arc rectifiers in aluminum production; suspended igniter for improved sintering; silica-slurry hot patching of furnace refractories; double water-jacketed screw feed cooler; and electric smelting of copper.

2-268. **The Mechanism of Carbon Removal in the Openhearth Furnace.** A. H. Jay. *Journal of the Iron and Steel Institute,* v. 157, Oct. 1947, p. 167-172.

Critical examination of a typical acid openhearth cast shows that rates of carbon removal at the end of the ore boil and during the limestone boil are closely related only to the degrees of oxidation at these stages (as judged by the respective Si and Mn contents) rather than to the product of the C and O_2 contents. This conclusion is supported by many previous observations of steelmaking data. On this basis, a reaction mechanism is developed which is substantiated by calculations of the relative concentrations of O_2 and Fe atoms on the surface of the CO-gas bubble. These show that the bubble can accommodate 3300 Fe atoms. Based on this the over-all O_2 content of the liquid bath is 0.009%. This value is in remarkable agreement with experimental data.

2-269. **Some Aspects of the Refining of High-Phosphorus Iron.** W. L. Kerlie. *Journal of the Iron and Steel Institute,* v. 157, Oct. 1947, p. 173-182.

Compares the phosphorus and carbon equilibria and the factors affecting the rate of carbon removal in the refining of iron on a thermodynamic basis. On the basis of the general equations developed, two examples of the refining of high-P iron are quoted and certain conclusions are reached from an examination of the results. Factors which determine oxide requirements and processing time and some notes on the more practical aspects of refining.

2-270. **An Introduction to the Interaction of Carbon and Iron Ore at Temperatures up to 1450° C.** H. L. Saunders and H. J. Tress. *Journal of the Iron and Steel Institute,* v. 157, Oct. 1947, p. 215-222.

Rates of reaction between three partially reduced ores and various forms of carbon were studied over a wide range of temperatures at varying deoxidations, using a special laboratory furnace. Rates up to 10% deoxidation per min. were observed.

2-271. **The Mechanism of the Carbon-Oxygen Reaction in Steelmaking.** C. E. Sims. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 15-28; discussion, p. 28-30.

See item 2-16.

2-272. **Oxygen in Basic Electric-Furnace Baths.** S. F. Urban and G. Derge. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 31-45; discussion, p. 45-49.

See item 2-139.

2-273. **The Origin of Silicate Inclusions in Basic Electric-Arc Furnace Steel of Higher Carbon Contents.** Axel Hultgren. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 50-77; discussion, p. 77-80.

Two types of steel made in a basic-lined arc furnace were investigated (a 1.10% C steel and a 0.65% C, 0.70% Si, 1.0% Mn, spring steel). Conditions for formation of silicate inclusions, effect of period in ladle, and value of different means for reducing amount of inclusions. 20 ref. (Translated from *Jernkontorets Annaler,* v. 129, no. 11, 1945, p. 633.)

2-274. **Preparation of Raw Materials for Fast Melting in an Electric-Arc Furnace.** Samuel D. Gladding. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 81-87.

Automatic control; transformers; methods of charging; charging scrap; scrap preparation; drying raw materials; meltdown of oxidizers and fluxes. (Reprinted from Yearbook of the American Iron and Steel Institute, 1946, p. 94.)

2-275. **The Oxidizing Period in Basic Electric Steelmaking.** Alex C. Texter. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 87-96; discussion, p. 96-104.

Three distinct methods of oxidation; control of the furnace charge; functions of the oxidizing slag, and the boiling and reboiling periods. Standard practices for 35-ton furnaces.

2-276. Melting Semikilled Steel in the Basic Electric Furnace. R. J. McCurdy and R. W. Farley. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 105-107; discussion, p. 113-122.

Charging for fast melting; tapping without blocking, with all additions to the ladle; pouring in open-top molds.

2-277. Production of Rimmed Steel in the Basic Electric Furnace. A. K. Moore. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 107-109; discussion, p. 113-122.

Practice at the Steel Co. of Canada, Hamilton.

2-278. Steelmaking Operation at Connors Steel Co. B. C. Blake. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 110-111; discussion, p. 113-122.

Steelmaking facilities comprise two top-charge Lectromelt furnaces; one a 4½-ton, and the other a 3-ton. Both are lined for basic operation.

2-279. Practice by Burlington Steel Co., Ltd. G. H. McCally. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 112-113; discussion, p. 113-122.

Electric-furnace production of straight-carbon merchant bar.

2-280. Melting Stainless Steel at South Works. J. H. Eisaman. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 123-127; discussion, p. 127-129.

Procedures using Heroult 3-phase, type-70 arc furnaces, tapping 80-ton heats.

2-281. Use of Inert Gas. P. M. Hulme. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 137-140.

Use of argon and nitrogen to remove dissolved gas from molten steel. Methods of determining the gas content of molten metals.

2-282. Progress in the Use of Argon Gas. W. M. Farnsworth. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 140-143.

Experience at Canton Alloy Plant of Republic Steel Corp.

2-283. Mechanism of Hydrogen Elimination From Fluid Steel. A. L. Ascik. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 143-145.

2-284. Melting of High Speed Steel in the Electric-Arc Furnace. R. Schempp and J. B. Schrader. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 146-154; discussion, p. 154-159.

Furnace equipment and accessories and their condition; make-up of the charge, from both physical and chemical viewpoints; types of alloy materials; slagmaking materials; particular phases of melting practice, such as meltdown and refining periods and specific temperature control, as well as tapping and teeming temperatures.

2-285. Arc Versus Induction Furnace Melting. S. F. Urban. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 159-161; discussion, p. 161.

2-286. Notes on Melting Heat and Corrosion Resistant Metals by the Acid Electric Process. Floyd O. Lemmon. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 163-166; discussion, p. 166-170.

2-287. Induction Melting of High-Alloy Steels. R. J. Wilcox. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 170-175; discussion, p. 175-184.

Furnace linings, melting practice, and control testing. Operating data.

2-288. Acid Electric Slags. G. R. Fitterer. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 185-196; discussion, p. 196-198.

The slag-fluidity test. Fundamental principles controlling reactions in acid furnaces. Experimental results.

2-289. Acid Electric Slags Are a Necessary Evil. E. C. Troy. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 199-203; discussion, p. 204.

The nomenclature and classification of slags. The need for slag to control degree of oxidation; suggestions for its control.

2-290. You're Stuck With Slag—Why Not Use It? J. B. Caine. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 204-209; discussion, p. 209-218.

A plot of partition constant for oxygen, or iron oxide, between metal and acid slag vs. temperature is independent of the analysis of either slag or metal. This is contrary to accepted thought (that oxygen content is mainly dependent on carbon content) but offers the possibility of producing steel free from pinhole porosity when poured in green sand, without use of strong deoxidizers, by use of a slag low in iron oxide to lower the oxygen content of the metal. The problem of inclusions in wrought steel and cast steel.

2-291. Known Methods of Sulphur Control. M. V. Healey. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 233-235; discussion, p. 235.

Procedures for sulphur elimination in basic electric melting at General Electric.

2-292. The Perrin Process. Jerome Strauss. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 236-238; discussion, p. 238-240.

Essentially the Perrin process consists of violent intermixing of steel and a predetermined slag for sulphur neutralization carried out to the point

of emulsification. A siliceous slag, very low in iron, was initially used. An aluminous slag has since been adopted. One-half to two-thirds reduction in sulphur content is claimed.

2-293. Desulphurized Steel Made by the Triplex Process. Harold DeMent. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 241-243; discussion, p. 243-245.

Use of soda-ash briquettes to produce a steel with a sulphur content below 0.050% from a low grade of steel scrap.

2-294. Possibilities of Use of Spodumene for Removal of Sulphur. G. T. Motock. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 245-246; discussion, p. 246-248.

Use of this lithium aluminum silicate for sulphur removal in both acid and basic steelmaking. Results show a marked increase in fluidity of both steel and slag and a removal of about 55% of the sulphur in the steel and about 45% of that in the slag.

2-295. Solidification of Steel Ingots. J. R. Fleche. *Iron Age,* v. 160, Oct. 9, 1947, p. 62-67; Oct. 23, 1947, p. 55-62.

Attacking the subject mathematically, in order to lead to a better understanding of the functioning of ingot molds, the author develops his analyses around K, a comparative measure of the linear freezing speed. In the first part of a four-part article, fundamental concepts regarding solidification are introduced, and methods whereby K values can be utilized are presented. In the second part, some requirements of mold design are discussed. Corrections to K values, to permit comparison with other types of steels and other types of ingots, and relative effects on speed of freezing of various mold shapes.

2-296. A Carbothermic Process for Production of Magnesium. H. A. Doerner. *Western Metals,* v. 5, Nov. 1947, p. 15-20.

Information from Bureau of Mines Reports of Investigations 3635, 3806, 3823, and papers presented orally by H. A. Doerner.

2-297. Oxygen-Accelerated Combustion in Openhearth Furnaces. E. T. W. Bailey. *Iron and Steel Engineer,* v. 24, Nov. 1947, p. 35-41.

The dual use of oxygen for accelerating combustion and burning elements in the bath. Charts for calculation of combustion conditions; photographs of actual flames.

2-298. A Measure of Dispersion of Carbide Spheroids. N. T. Belaiew. *Metal Progress,* v. 52, Nov. 1947, p. 827.

New scheme and chart for the numerical characterization of spheroidite.

2-299. Side-Blown Converter Producing Carbon and Alloy Steels. F. Cousans. *American Foundryman,* v. 12, Nov. 1947, p. 30-34.

Exchange paper from Institute of British Foundrymen (see item 2-195).

2-300. The Effect of Nozzle Size on the Surface Quality of Slab Product of Low-Carbon Rimmed Steel. Condensed from paper by C. J. Hunter. *Industrial Heating,* v. 14, Nov. 1947, p. 1860, 1862.

Results of experiments on rimmed, mechanically capped, and semikilled low-carbon steels. (Presented at recent National Open Hearth Steel Conference, Cincinnati, Ohio.)

2-301. Basic Openhearth Slag Control. Part IV. Charles R. Funk. *Blast Furnace and Steel Plant,* v. 35, Nov. 1947, p. 1372-1374.

Charts and data concerning manganese recovery. (To be continued.)

2-302. Electrical Equipment of Aluminum Factory. *Engineering,* v. 164, Nov. 7, 1947, p. 440.

Equipment at the South Wales Aluminum Co., Ltd., Resolven, Glamorgan.

2-303. Experimental Steel Production With Oxygen-Enriched Blast in Bessemer Converter at Kuznetsk Steel Works. V. V. Konjakov. *Engineers' Digest (American Edition),* v. 4, Nov. 1947, p. 522-523

Details of performance and converter construction. (Translated and condensed from *Kislorod,* v. 3, 1946, p. 1-11.)

2-304. Purification of Zirconium by Ion Exchange Columns. John A. Ayres. *Journal of the American Chemical Society,* v. 69, Nov. 1947, p. 2879-2881.

Method is rapid and easily adaptable to large scale procedures. Results of several experiments show the efficiency of purification of zirconium from iron, titanium, beryllium, and lanthanum.

2-305. The Use of Gaseous Oxygen in Metallurgical Processes. George V. Slottman and P. M. Hulme. *Metal Progress,* v. 52, Dec. 1947, p. 963-967.

Developments of past year resulting from the first large-scale use in the openhearth in the U. S. Limiting factors in openhearth practice; control of hot metal; use during meltdown; use in working, and finishing the heat.

2-306. Fluidization in Noncatalytic Operations. R. P. Kite and E. J. Roberts. *Chemical Engineering,* v. 54, Dec. 1947, p. 112-115.

Application of the process, which has been so successful in the refinery, to miscellaneous noncatalytic operations, including roasting of concentrates and lime burning.

2-307. Furnace Deoxidation in Basic Openhearth Practice. *Industrial Heating,* v. 14, Dec. 1947, p. 2020, 2022, 2024, 2026.

Discusses the factors to be considered when engaging in the deoxidation of a basic openhearth furnace. (Condensed from paper by W. O. Philbrook, presented at 30th Annual Open-Hearth Conference, Cincinnati.)

2-308. Electric Furnace Steelmen Study Quality Problems. *Iron Age,* v. 160, Dec. 11, 1947, p. 105-107.

Reviews proceedings of Fifth Annual A.I.M.E. Electric Furnace Steel Conference.

2-309. Electric Furnace Operators Evaluate Steel Cleanliness. *Steel,* v. 121, Dec. 22, 1947, p. 74, 76, 78, 80.

Reviews proceedings of Fifth Annual Electric Furnace Steel Conference sponsored by the Electric Furnace Steel Committee of the Iron and Steel Division, A.I.M.E., Pittsburgh, Dec. 4-6, 1947. Among topics covered were: trend in electric-furnace shops towards use of lime-silica or slightly carbidic slag during refining period; source of refractory inclusions; Dornin process for high ingot yield; and oxygen practice.

2-310. Smelting in the Cupola Using an Oxygen-Enriched Blast. L. I. Levi. *Kislorod (Oxygen),* v. 4, May-June 1947, p. 1-14. (In Russian.)

Results of an extensive investigation of the effects of various factors on the performance and economics of this process. The temperature of the melt did not increase on use of an enriched blast, but sometimes even decreased. Oxygen consumption was 60 cu. m. per ton of pig iron. Results indicate that use of the enriched blast is quite profitable.

2-311. Jarnsvampens Anvandning Vid Svensk Staltillverkning. (Application of Sponge Iron in the Swedish Steel Industry.) Magnus Tigerschiold. *Jernkontorets Annaler,* v. 131, no. 9, 1947, p. 295-339; discussion, p. 339-372.

Composition of the iron used; methods of smelting and preparation for use in electric steels. 14 ref.

2-312. High-Phosphorus Iron; Some Aspects of Refining. W. L. Kerlie. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 618-621; discussion, p. 634-636.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 2-269.

2-313. Liquid Steel; Mechanism of Carbon Removal in the Openhearth Furnace. A. H. Jay. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 616-618; discussion, p. 632-634.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 2-268.

2-314. Recovery of Nonferrous Metals From Pyrite. W. H. Dennis. *Mine & Quarry Engineering,* v. 13, Dec. 1947, p. 358-362.

Pyrite is roasted in mechanical hearth furnaces, the SO_2 produced passing to the acid plant. The residue, containing copper, zinc, cobalt, iron, and precious metals, is ground, salt added, and reroasted to render the nonferrous metals soluble, the iron oxide remaining unattacked. Copper chloride is leached out, leaving iron oxide. The residual liquor contains other nonferrous metals which are recovered by successive precipitation and filtration.

2-315. Relative Effect of Lime and Dolomite Fluxes on Cupola Irons and Cupola Operation. C. C. Sigerfoos and H. L. Womochel. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 196-199.

Previously annotated in R.M.L., v. 2, 1945.

2-316. Steel for Castings; Methods of Production. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 339-341.

42 references.

2-317. Grain Refinement of Magnesium Casting Alloys. James A. Davis. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 352-362.

2-318. Melting Magnesium Alloys. L. M. Nash. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 410-412.

Previously annotated in R.M.L., v. 3, 1946.

2-319. Electric Induction Steel "E.I.S." Frank T. Chesnut. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 135-141; discussion, p. 141.

Previously annotated in R.M.L., v. 3, 1946.

2-320. Electric Steelmaking in the Arc Furnace. Conrad Wissmann. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 143-149; discussion, p. 149-150.

Previously annotated in R.M.L., v. 3, 1946.

2-321. Production of Nickel and Chromium Steels From Laterite Ores. T. F. Baily. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 185-193; discussion, p. 193.

Previously annotated in R.M.L., v. 3, 1946.

2-322. Preparation and Properties of Ductile Titanium. R. S. Dean, J. R. Long, F. S. Wartman, and E. L. Anderson. *Transactions of the American Institute*

of Mining and Metallurgical Engineers (Institute of Metals Division), 1946, p. 369-381.

Previously annotated from *Metals Technology*, Feb. 1946, T.P. 1961 in R.M.L., v. 3, 1946.

2-323. **The Chromium-Oxygen Equilibrium in Liquid Iron.** Hsin-Min Chen and John Chipman. *Transactions of American Society for Metals*, v. 38, 1947, p. 70-113; discussion, p. 113-116.

Previously annotated in R.M.L., v. 3, 1946, item 2-139.

2-324. **The Physical Chemistry of Acid Refining Process (From the Kinetic Point of View).** Yap, Chu-Phay. *Transactions of American Society for Metals*, v. 40, 1948, p. 83-119.

An attempt has been made to work out the mechanism of the refining process by studying the problem of thermodynamic equilibrium from the kinetic point of view—by following the actual change in the value of the steady-state constants with the progress of the heat. The problem of relative rates of oxidation of Si, Mn, and C was studied in the region approaching a final state of diffusion equilibrium. The rate of attainment of deoxidation equilibria in the acid openhearth is indicated as a result of this study to be a problem of the rate of FeO diffusion. Acid openhearth heats, typical of American, British, and German practices, were extensively studied and carefully analyzed.

2-325. **Macrosegregation in Some Alloy Steel Ingots.** J. W. Spretnak. *Transactions of American Society for Metals*, v. 40, 1948, p. 897-916; discussion, p. 916-921.

See item 2-193.

SECTION III

PROPERTIES

3-1. A New Radar Transformer Steel. G. H. Cole and R. S. Burns. *Materials & Methods,* v. 24, Dec. 1946, p. 1457-1460.

New magnetic alloy developed during the war specifically to increase the effectiveness of radar pulse transformers. Has a carbon content of less than 0.01%. Properties, characteristics and peacetime applications.

3-2. Nickel and High-Nickel Alloys. Norman E. Woldman. *Materials & Methods,* v. 24, Dec. 1946, p. 1475-1490.

Various wrought nickels and nickel alloys, and the best and most up-to-date practices for welding, cleaning, finishing, machining and otherwise processing this important group of engineering materials. Tables list various properties.

3-3. The Mechanical Properties, Including Creep, of Aluminum Bronzes at Elevated Temperatures. E. Voce. *Metallurgia,* v. 35, Nov. 1946, p. 3-9.

Creep results for tin bronze, gun metals, and a copper-silicon-manganese alloy show that the tin-bearing alloys are much inferior to the aluminum bronzes in their resistance to creep and, while the silicon alloy appears to be slightly superior at 400° C., this material is handicapped by relatively large initial extensions. For such reasons, and because of their great resistance to oxidation and scaling, the aluminum bronzes appear to be the most promising of the copper-base alloys for service at moderately elevated temperatures.

3-4. Magnesium Casting Alloys—Their Production and Use. G. B. Partridge. *Metallurgia,* v. 35, Nov. 1946, p. 13-17.

First of series outlines British recovery process, various alloys of magnesium and their macrostructure, and compositions and properties of British commercial alloys. Composition and properties of a number of magnesium alloy sand and gravity die castings. (To be continued.)

3-5. Magnesium-Cerium-Zirconium Alloys: Properties at Elevated Temperatures. A. J. Murphy and R. J. M. Payne. *Journal of the Institute of Metals,* v. 73, Nov. 1946, p. 105-127.

By the addition of zirconium to magnesium-base alloys, alloys are obtained which have mechanical characteristics at room temperature comparable to those of the usual casting alloys Elektron A8 and AZ91, but possessing resistance to creep of a far higher order. When tested at 200° C., the creep resistance of certain of the magnesium-cerium-zirconium alloys is very little inferior to that of the widely used aluminum alloys of the type covered by specifications D.T.D. 133c and 287. The combination of good casting qualities and good mechanical properties at ordinary and elevated temperatures makes the magnesium-cerium-zirconium alloys attractive for some important light-weight stressed components of engines.

3-6. Influence of Structure and Composition of Alloys on Their Mechanical Properties. Y. B. Fridman. *Engineers' Digest,* v. 3, Nov. 1946, p. 579-580.

Analyzes influence of such factors as grain size, distribution of solid solutions, intercrystalline brittleness and tempering temperatures on the mechanical properties of metals under varying conditions, including extreme low temperatures. Treats the latter in a novel manner. (Condensed from *Vestnik Inzhenerov i Tehnikov,* no. 2, 1946, p. 44-50.)

3-7. Physical Properties of Steel Control Cable. C. W. Meyers. *Automotive and Aviation Industries,* v. 95, Dec. 15, 1946, p. 44-45, 62, 64.

Wartime development of a flexible steel aircraft control cable having a coefficient of linear expansion practically the same as that of the aluminum alloy airframe. Coefficient of expansion; modulus of elasticity; AE value (relation between load and

stretch); magnetic permeability; breaking weight; fatigue properties.

3-8. Metallic Film Formation at Low Temperatures. A. Goetz, E. L. Armi, M. G. Foster, and A. B. C. Anderson. *Chemical Reviews,* v. 29, Dec. 1946, p. 481-495.

Apparatus and method for condensing thin films from a molecular beam of pure lead at temperatures down to 14° absolute. Electric conductivity of these films was measured during and after exposure to the beam. Onset of conductivity depends upon temperature of the film formation. Changes occurring in the films after exposure. 15 ref.

3-9. Recherches sur la Variation de la Resilience de l'Acier au Carbone Moule, d'Elaboration Electrique Basique. (Investigation of the Impact Value (Strength) Variation of Cast Carbon Steel.) P. Bastien and L. Alanore. *Comptes Rendus,* v. 223, Oct. 21, 1946, p. 631-632.

One hundred and thirty-three different cast carbon steel test specimens were investigated to determine the influence of sulphur, phosphorus, manganese, carbon on impact strength.

3-10. The Statistical Aspect of Fatigue of Materials. A. M. Freudenthal. *Proceedings of the Royal Society,* v. 187, Dec. 13, 1946, p. 416-429.

This phenomenon is the result of progressive destruction of the cohesive bonds as a result of the repetitive action of an external load. It has the typical features of a mass phenomenon. By applying the fundamental rules of the theory of probability, many of the experimentally established relations between the principal variables can be theoretically deduced from the purely formal assumption of the existence of a statistical distribution function of the separation-strength of cohesive bonds. 18 ref.

3-11. Electric Steel Sheets. (Concluded.) J. S. Vatchagandhy and G. P. Contractor. *Iron and Steel,* v. 19, Dec. 1946, p. 798-800.

Grain size and orientation; permeability; physical characteristics. Results of various tests shown in tables. 11 ref.

3-12. Metallic Carbides and Hard Alloys. W. G. Cass. *Industrial Diamond Review,* v. 6, Dec. 1946, p. 376-378.

Recent work in Russia and France reviewed.

3-13. Deformation in Relation to Time, Pressure and Temperature. P. G. Nutting. *Journal of the Franklin Institute,* v. 242, Dec. 1946, p. 449-458.

The derived deformation and energy functions are applied to some experimental data on steel tape which include thermal and relaxation observations. Thermodynamic relations governing both elastic and viscous behavior are developed.

3-14. Nyare Svenska rön Beträffande Stals Åldring. (Results of Recent Swedish Investigations on Aging of Steel.) B. D. Enlund. *Jernkontorets Annaler,* v. 130, no. 10, 1946, p. 553-574.

Investigations indicate that aging takes place in all mild steels after straining. This appears in the form of increasing hardness, yield point, ultimate strength, and sometimes brittleness. The latter is modified by the structural state and composition of the steel. Aluminum addition reduces age hardness and brittleness. Steels embrittled by straining and aging have comparatively good impact tenacity above 100° C., and may be restored to normal tenacity by annealing at 600 to 650° C. This treatment is shown to be useful as a final procedure in manufacture of various forgings.

3-15. Nyare Utländska rön Beträffande Åldring i Mjukt Stal. (Results of Investigations in Foreign Countries on Aging of Mild Steel.) Axel Hultgren. *Jernkontorets Annaler,* v. 130, no. 10, 1946, p. 575-592; discussion, p. 592-598.

Reviews results published in foreign technical literature during the last ten years regarding quench aging and strain aging of mild steel. 15 ref.

3-16. Experimental Investigation of the Flow of Molten Metals in an Open Channel. E. J. Ravinovitch. *Reports of Academy of Sciences of U.S.S.R.,* v. 54, no. 3, 1946, p. 201-203. (In Russian.)

Mechanism was investigated using a specially developed measuring apparatus. Data obtained are presented in the form of diagrams, showing that the mechanism of the molten metal flow under turbulent conditions does not differ from any common liquid turbulent flow.

3-17. Strength and Ductility. Maxwell Gensamer. Pennsylvania State College, School of Mineral Industries, Technical Paper 113, 1946, 60 p.

Efforts to understand the relationships among the measured mechanical properties of metals and their mechanical behavior in service, and the way in which these properties and service characteristics are controlled by chemical composition and structure. (Reprinted from *Transactions of the American Society for Metals,* v. 36, 1946, p. 30-60.) 11 ref.

3-18. Which Cast Steel? Part II. E. J. Wellauer. *Machine Design,* v. 19, Jan. 1947, p. 111-117.

Commercially available cast steels. Tables give properties and specifications.

3-19. Aluminum Alloy 75S. *Machine Design,* v. 19, Jan. 1947, p. 143-145.

Properties; physical constants; characteristics; applications; fabrication; heat treatments; resistance to corrosion; galvanic corrosion; corrosion resistant finishes; material designations.

3-20. Magnetoresistance and Domain Theory of Iron-Nickel Alloys. R. M. Bozorth. *Physical Review,* v. 70, Dec. 1 and 15, 1946, p. 923-932.

Measurements of change of electrical resistivity with magnetization and with tension are reported for iron-nickel alloys containing 40 to 100% nickel. Measurements are made in transverse as well as longitudinal magnetic fields, and the difference between the resistance so measured is independent of the distribution of domains in the unmagnetized state. 15 ref.

3-21. Activation of Metallic Copper by Oxidation and Reduction. W. E. Garner and F. S. Stone. *Nature,* v. 158, Dec. 21, 1946, p. 909.

The activation of copper by repeated oxidation and reduction results in a great increase in surface area. This phenomenon studied using both H_2 and CO. Essential differences were found which shed light on the mechanisms involved.

3-22. Low-Alloy, High-Tensile Steels, Their Properties, Workability and Weldability. George M. Huck. *Welding Journal,* v. 26, Jan. 1947, p. 32-35.

The development of these steels, with special reference to the "Mayari R" steel produced by Bethlehem.

3-23. Flakes in Welds. M. Lefevre. *Welding Journal,* v. 26, Jan. 1947, p. 57s-64s.

This defect appears in steels and weld metal; conditions and causes for its development; remedies; references to the literature on the subject. Concludes that absorption of hydrogen is the major cause of flakes. Experimental results indicate that flakes can usually be eliminated either by several weeks or months' aging, or by heat treatment at 480° F. for a couple of hours. 14 ref.

3-24. Hot Shortness of the Aluminum-Silicon Alloys of Commercial Purity. A. R. E. Singer and P. H. Jennings. *Journal of the Institute of Metals,* v. 73, Dec. 1946, p. 197-212.

Hot shortness of the commercially pure aluminum-silicon alloys was studied by means of casting and welding experiments. Under the conditions of casting used, the severity of cracking of the alloys increases with increasing silicon content to a maximum at approximately 0.7% and then decreases to zero with alloys containing about 3% silicon. In welding experiments, the maximum amount of cracking was found to occur at a composition of approximately 0.8% silicon, the severity of cracking then decreasing to a low value as before.

3-25. A Note on the Influence of Additions of Thorium to Magnesium-Base Alloys. F. A. Fox. *Journal of the Institute of Metals,* v. 73, Dec. 1946, p. 223-228.

A rough, exploratory examination of the effects of additions of thorium on magnesium and on two magnesium-base alloys indicates that, although it resembles zirconium, additions of thorium to magnesium do not produce the grain-refining effects caused by zirconium. Up to about 1.2% thorium can be introduced into magnesium-zinc alloys, but the alloys are weak and show intercrystalline fractures. Thorium will not alloy with magnesium alloys containing aluminum, but it has some effect in reducing the iron content of such alloys.

3-26. Stability of Steels. A. B. Wilder and J. D. Tyson. *Western Metals,* v. 5, Jan. 1947, p. 13, 57.

The grades or chemical compositions of steels which afford greatest resistance to graphitization with retention of favorable creep-rupture characteristics.

3-27. Gas Porosity in Aluminum Alloys. Hiram Brown. *Foundry,* v. 75, Feb. 1947, p 88, 199, 200, 203, 206, 208, 210, 212, 214.

Chief, if not only, cause is presence of hydrogen in the metal. This is brought about by hydrogen pickup from products of combustion, from water and oil, from inclusion of various alloys. Precautions which will help avoid gas porosity and degassing methods. (Presented at A.F.A. Regional Foundry Conference, Chicago, Nov. 21-22, 1946.)

3-28. Cast Irons. William F. Chubb. *Iron and Steel,* v. 20, Jan. 1947, p. 19-22.

Thermal stability of some chromium-nickel-copper alloys was investigated in an attempt to develop an alloy for chill-cast iron rolls which would not require prolonged heat treatment for surface hardness above Brinell 550. However, all of the combinations tried lost hardness rapidly during the short-cycle heat treatment required to improve the properties of the internal portions of the roll.

3-29. New Strong Aluminum Casting Alloy. Harold Knight. *Materials & Methods,* v. 25, Jan. 1947, p. 68-71.

Properties and applications of new 11% Mg aluminum alloy. Addition of fractional percentages of beryllium and boron, and use of special techniques during melting and casting have resulted in considerable increase in tensile strength, impact strength,

elongation, and high corrosion resistance. It is heat treatable, and the values given are those reached in the fully heat treated and aged condition.

3-30. New 9% Nickel Steel Tubing—Properties and Processing. H. D. Newell, J A. Manfre and M. A. Cordovi. *Materials & Methods,* v. 25, Jan. 1947, p. 62-67, 159.

Its mechanical and working characteristics, its heat treating behavior and its weldability. Suggests fields of application.

3-31. Thermal Properties of Metals. *Materials & Methods,* v. 25, Jan. 1947, p. 123.

Table gives specific heats, melting points, heats in solid and liquid at melting points, latent heats of fusion, average pouring temperatures, and heats in liquid at pouring temperature of 45 metals and alloys.

3-32. Aluminum-Magnesium Alloys. F. Santini and J. Herenguel. *Metal Industry,* v. 70, Jan. 24, 1947, p. 63-64.

The "swelling" defect in the welding of worked products of the Al-Mg alloy group is due to the presence of preexisting gaps, breaks or flaws in the alloy. (From *Revue de l'Aluminium.*)

3-33. The Development of a Turbosupercharger Bucket Alloy. E. Epremian. *Canadian Metals & Metallurgical Industries,* v. 10, Jan. 1947, p. 22-25, 31.

Experimental data obtained in the development of a cobalt-base alloy for turbosupercharger bucket application. (Paper presented to American Society for Metals, November 1946.)

3-34. Notch Sensitivity of Metals. M. S. Paterson. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 19,* Dec. 1946, 26 p.

Reviews published articles on notch sensitivity in fatigue of metals. Sources of stress concentration and suggested measures of their effects in fatigue. Theoretical aspects of notch effects which include many attempts to explain the discrepancy between the theoretical stress concentration factor and the observed strength reduction factor. Influence of many physical and mechanical factors on notch sensitivity.

3-35. The Failure of Metals by Fatigue. J. Neill Greenwood. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 1,* Dec. 1946, 6 p.

After a brief historical survey, the physical features of a fatigue failure are described. Variables controlling fatigue failure are the relationship between magnitude of stress and number of cycles, the presence of stress concentration, the influence of repeated stress below and above the fatigue limit. The various types of stress concentrators are listed.

3-36. Theories of the Mechanism of Fatigue Failure. W. Boas. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 3,* Dec. 1946, 9 p.

Experiments carried out on metallic single crystals; those using X-ray diffraction methods show that failure by fatigue is merely a special case of failure under all forms of stressing actions and not a special problem of its own, and it must be considered as a consequence of slip. Deformation is localized in the immediate neighborhood of the fatigue fracture where it reaches a critical amount. It is the total strain which has a certain characteristic value at fracture. Recent theories of the mechanism of fatigue failure.

3-37. Fatigue of Bolts and Studs. J. G. Ritchie. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 17,* Dec. 1946, 26 p.

Reviews published information relating to the fatigue of bolts, studs and nuts. Subject is covered in seven sections, namely: the thread in its various standard forms; type of material; method of manufacture, showing the superiority of the thread rolling process; surface condition and treatment, such as hardening, shotpeening or plating; design of bolts and studs; design of nuts; and finally the assembly process showing the effect of correct prestressing and how it is obtained.

3-38. The Fatigue of Welded Steel Tubing in Aircraft Structures. C. J. Osborn. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 18,* Dec. 1946, 17 p.

Briefly reviews literature concerned with fatigue in tubular steel aircraft structures. Various types of welded specimens used in fatigue tests in attempts to approximate service conditions indicate that joint design is probably the most important single factor affecting fatigue strength. The effects of chemical composition, welding technique, heat treatment, etc., on the fatigue strength of welded joints in steel tubing have also been investigated. The magnitude of fluctuating stresses in aircraft components is discussed and the problem illustrated by some examples of service failures.

3-39. Composition and Physical Properties of Steel in Relation to Fatigue. D. O. Morris. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 20,* Dec. 1946, 20 p.

Relation of the various physical properties and effect of the individual constituents of steels on fatigue properties. Critical treatment is given of the relation of notched impact test to fatigue properties. Attention is drawn to the fact that phosphorus tends to

increase the fatigue limit as do carbon, manganese, nickel, and chromium. The opinion is expressed that sulphur up to at least 0.10% does not appreciably affect the fatigue properties of steels, either longitudinally or transversely, and experimental work carried out on high-sulphur free-cutting steels supports this belief.

3-40. Failures of Railway Materials by Fatigue. Hugh O'Neill. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 24,* Dec. 1946, 8 p.

Type of fatigue failure in rails, tires, wheelcenters, axles, fireboxes and staybolts with reference to the accelerating effect of corrosion and also to the incidence of fatigue cracks in materials under compression. Instances of fatigue failure of parts in transit.

3-41. The Influence of Radial Pressure From a Press Fit on the Endurance Limit of Axles and Crank Pins. G. W. C. Hirst. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 25,* Dec. 1946, 9 p.

Work done since 1936 on the fatigue failure of axles and its relation to press fits by members of the staff of Redfern Laboratory of the N. S. W. Railways. Evolution of opinion regarding the cause of fatigue cracking in the wheel seats of railway axles is traced from the "notch effect" theory advanced by Kuhnel to the later theory based on the presence of induced tensile stresses at the surface and fretting corrosion at the mating surfaces. Possibility of employing cast iron wheelcenters as a means of minimizing fretting corrosion.

3-42. Fatigue Failure of Axles of Car and Wagon Railway Rolling Stock. E. Connor. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 26,* Dec. 1946, 8 p.

Failure of those portions of the axles carrying the wheels. Methods of detecting the presence of cracks hidden by the wheel boss; conclusion reached is that removal of the wheel is still the only positive means of doing this. Various possible modifications in design, material and finish, that might help to minimize the incidence of fatigue cracking in axle wheel seats. Precautions that may diminish the frequency of fatigue cracking.

3-43. Types of Fatigue Failure in the Steel Industry. W. O. Beale. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 27,* Dec. 1946, 7 p.

Fatigue failures met with in the heavy steel industry classified according to apparent cause and location the relative frequencies are given. Corrective measures used to eliminate the failures are indicated.

3-44. Some Practical Aspects of Wire Fatigue in Aerial Telephone Lines Based on an Analysis of Wire Breakages. D. O'Donnell and A. S. Bundle. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 28,* Dec. 1946, 9 p.

Wire breakages analyzed during 6 mo. over some 30,600 wire miles of telephone lines on selected routes. Extent of wire fatigue and incidence of such faults in relation to points of failure; construction features of the joints and terminations where failures occur.

3-45. The Vibration of Telephone Line Wires. H. C. Levey and P. R. Brett. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 29,* Dec. 1946, 20 p.

Method of approach and results so far obtained in determination of the frequency of vibration of an experimental line wire and the wind velocities causing these vibrations.

3-46. Fatigue Failures of Lead Sheathing of Telephone Cables. S. D. Chivers. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 30,* Dec. 1946, 4 p.

Types of faults usually found together with some other classes of faults showing a similar appearance. Adoption of mitigative measures.

3-47. Magnetostriction of Transformer Steel Subjected to Thermomagnetic Treatment. J. Shur and A. Khokhlov. *Journal of Physics* (U.S.S.R.), v. 10, no. 6, 1946, p. 540-542. (In English.)

Thermomagnetic treatment of ferromagnetic material consists in cooling in the presence of an external magnetic field from some temperature above the Curie point to room temperature. This sometimes results in production of magnetic anisotropy. Magnetostriction curves of a polycrystalline transformer steel, before and after such a treatment. Comparison of the curves shows that a strongly pronounced magnetic texture is produced by the treatment.

3-48. Rate of Oxidation of High-Chromium Iron-Chromium-Aluminum Alloys. I. I. Kornilov and A. I. Spikelmann. *Reports of the Academy of Sciences of U.S.S.R.,* v. 53, Sept. 21, 1946, p. 813-816. (In Russian.)

The oxidation process at high temperatures is assumed to consist of: first, oxidation of the three components; and second, diffusion of aluminum on the surface of the alloy. To aid in development of high temperature alloys, a series of high-chromium alloys was investigated for chemical constitution, weight loss, and changes in electrical properties, after 1000 hr. at 1200° C. Results are presented in chart form. The most heat resistant combinations found were: 25% Cr, 7 to 10% Al; and 40% Cr, 10 to 13% Al.

3-49. Hardness Curve of Nickel-Copper Alloys. K. A. Osipov. *Reports of the Academy of Sciences of U.S.S.R.*, v. 53, Sept. 21, 1946, p. 821-823. (In Russian.)

Maximum hardness of Ni-Cu alloys was found to occur at about 60 atomic % (62 wt. %) Cu. A theory is presented which explains the shape of the hardness curve and the location of its maximum point in terms of atomic structure.

3-50. Rate of Oxidation of Chromium-Nickel-Iron Austenitic Alloys. I. I. Kornilov and A. I. Spikelmann. *Reports of the Academy of Sciences of U.S.S.R.*, v. 54, Nov. 21, 1946, p. 515-518. (In Russian.)

Ferritic and austenitic heat resistant alloys, having iron as base metal, are oxidized at elevated temperatures mainly on account of presence of an easily oxidized element. Experimental results show this element to be aluminum in ferritic chromium-aluminum alloys. In austenitic chromium-nickel alloys containing carbon and silicon, carbon, silicon and chromium are all oxidized readily up to 1100 to 1150° C. Above 1200° C., only carbon and silicon are affected appreciably.

3-51. Which Cast Steel? Part III. Influences of Processing Operations. E. J. Wellauer. *Machine Design*, v. 19, Feb. 1947, p. 138-142.

An investigation of the factors which relate to processing operations, particularly welding and machining; economic considerations in specification and design.

3-52. Variation Thermique de l'Animantation Spontanée. (Thermal Variation of Spontaneous Magnetization.) Charles Guillaud. *Comptes Rendus*, v. 223, Dec. 23, 1946, p. 1110-1112.

Hypothesis that all ferromagnetic bodies may acquire a definite magnetization called spontaneous magnetization in the absence of an exterior field only by the influence of a molecular field is experimentally confirmed.

3-53. The Flow of Metals at Elevated Temperatures. Part I. J. H. Hollomon and J. D. Lubahn. *General Electric Review*, v. 50, Feb. 1947, p. 28-32.

A general relation for the combined effects of three variables on the stress required for plastic flow. Applicability of the general relation to a wide variety and range of conditions. (To be continued.)

3-54. Tool Steels. Part II. L. Sanderson. *British Steelmaker*, v. 13, Feb. 1947, p. 90-93.

Properties of hot working steels, die steels and shock resistant steels. (To be continued.)

3-55. Is the Hardenability of Boron Steels Indirectly Due to Complete Deoxidation? Gerard H. Boss. *Metal Progress*, v. 51, Feb. 1947, p. 265.

Several assumptions to help explain the unusual effect of boron on the hardenability of steel.

3-56. Creep in Hot Valve Springs. Alberto Oreffice and Luigi Locati. *Metal Progress*, v. 51, Feb. 1947, p. 269-270.

Creep behavior of small helical steel springs under special applications exists at 175° F. Its effect is revealed in the loss of load in needle valve springs in the fuel injector of diesel engines. Average test readings of four types of spring wire, after coiling and pretreating in various ways.

3-57. Metallurgical Substitutions. Albert M. Portevin. *Metal Progress*, v. 51, Feb. 1947, p. 271-272.

President of French Society for Metallurgy outlines the fundamental factors to be considered in making decisions concerning the use of alternate metals under the less stringent peacetime conditions now approaching. Many important relationships between properties of metals become readily apparent when they are compared at temperatures which are the same fraction of the difference between absolute zero and temperature of fusion, or Curie point, instead of at room or other fixed temperatures.

3-58. Hot Shortness of Some Aluminum-Iron-Silicon Alloys of High Purity. A. R. E. Singer and P. H. Jennings. *Journal of the Institute of Metals*, v. 73, Jan. 1947, p 273-284.

Research carried out on the hot cracking tendencies of castings and welds in the aluminum-iron-silicon alloys shows that as the percentage of silicon increases, the amount of cracking increases sharply to a maximum and then decreases to a low value. The effect of iron is to delay the onset of cracking, to reduce the severity of cracking at the maximum, and to push the position of the maximum to a higher percentage of silicon. Recommends that when commercially pure aluminum is to be cast or welded in conditions where contraction stresses may arise, the silicon content should not exceed the iron content.

3-59. Outstanding Properties of the Magnesium-Zirconium Alloys. C. J. P. Ball. *Metallurgia*, v. 35, Jan. 1947, p. 125-129.

The importance of zirconium as an alloying element in producing exceptionally high proof stress, ultimate stress and elongation. These wrought alloys are easy to work and have good mechanical properties which may bring about a revolution in the ultra-light alloy casting field. (To be continued.)

3-60. Low-Carbon Manganese-Vanadium Steel Forgings. *Vancoram Review*, v. 5, no. 2, p. 11, 16.

Typical tensile properties of man-

ganese-vanadium steel of given composition in as-forged condition; minimum mechanical properties of the same steel and of the same size heated locally in a forge fire to about 1775° F.; and tensile test results illustrating the comparative insensitivity to various thermal treatments, even for steels at the top of the composition limits.

3-61. Vanadium Data Sheet—Vanadium Spring Steels. T. W. Merrill. *Vancoram Review,* v. 5, no. 2, p. 12-13, 18.
Tensile properties shown indicate, in a comparative sense, the high ratio of yield point to tensile strength, together with good ductility, which these steels possess.

3-62. Elastic Limits and Permanent Set in Springs. Part I. *Mainspring,* v. 11, Feb. 1947, p. 1-4.
Elastic limit and set in springs hardened and drawn from high-carbon steels or from such materials pretempered. (To be continued.)

3-63. Rigidized Metal—a Modern Material. D. E. Olshevsky. *Materials & Methods,* v. 25, Feb. 1947, p. 93-98.
Rigidized metal is design-strengthened sheet with two-dimensional pattern. Types of patterns and their properties; composite panels and structures; selected applications; advantages and limitations; assembly; future field of usefulness.

3-64. Stability of Alloys to Oxidizing Atmospheres. *Materials & Methods,* v. 25, Feb. 1947, p. 125.
Temperatures given in table are those below which scaling losses are less than 0.0002 to 0.0004 gm. per sq. cm. per hr.

3-65. New Magnetic Alloy Opens Way for Lightweight Motors. *Iron Age,* v. 159, Feb. 27, 1947, p. 59.
New alloy, 35% Co, 64% Fe, and 1% Cr, carries more magnetism than any other alloy practical for use in motors and generators and is tough enough to withstand intense vibration. It will make possible compact electric motors and generators that are an estimated 10% smaller and lighter than those of equal power now built for aircraft.

3-66. Absorbed Gases in Cast Iron. E. V. Somers and D. W. Gunther. *Foundry,* v. 75, March 1947, p. 66-69, 218, 220, 222, 224, 226, 228.
Critical discussion of the literature on the effects of these gases and results of experimental investigations. The effect of tapping temperature on the physical and chemical properties of gray cast iron. 15 ref.

3-67. Cast Iron and Steel. Ernest C. Pigott. *Iron and Steel,* v. 20, Feb. 1947, p. 43-45.
Influence and commercial applications of constituent elements. Data on aluminum, arsenic, beryllium, boron, carbon, cerium, chromium. (To be continued.)

3-68. Cast Irons. Thermal Stability of Some Chromium-Nickel-Copper Alloys. Parts II and III. William F. Chubb. *Iron and Steel,* v. 20, Feb. 1947, p. 59-61.
An alloy containing 0.5% Cr, 0.5% Ni, and 1.5% Cr was relatively unstable to heat treatment. 0.4 to 0.6% Si was added to the alloy and the percentage of Cr was increased to 1.25 to 1.50. This alloy was much more stable. The effect of heat treatment when copper is present in excess of its normal solubility limit was investigated. Tables, charts, and micrographs.

3-69. The Heat of Combustion of Tungsten Carbide, WC. L. D. McGraw, Harry Seltz and Paul E. Snyder. *Journal of the American Chemical Society,* v. 69, Feb. 1947, p. 329-331.
Determined in a precision calorimeter, and heat of formulation calculated from the results. 11 ref.

3-70. Maximum Energy Product of Permanent Magnet Steels. Lionel Fleischmann. *Electrical Engineering,* v. 66, March 1947, p. 318.
A graphical method for finding the maximum energy product for any kind of material.

3-71. Quality and Service of Openhearth Steel Rails From the Kertch Works. L. L. Pinchusovitch and O. N. Uskova. *Bulletin of the Academy of Sciences of U.S.S.R.,* Section of Technical Sciences, no. 10, 1946, p. 1421-1429. (In Russian.)
Describes an experimental investigation of the properties of steel rails produced from an arsenic-containing ore in the openhearth. The wear properties of the rails were higher than those produced from other ores, and the arsenic content (0.09 to 0.15%) did not affect the strength of the steel.

3-72. A New Magnetic Material of High Permeability. O. L. Boothby and R. M. Bozorth. *Journal of Applied Physics,* v. 18, Feb. 1947, p. 173-176.
The preparation, heat treatment, and properties of Supermalloy, a magnetic alloy of iron, nickel, and molybdenum. In the form of 0.014-in. sheet it has an initial permeability of 50,000 to 150,000μ, a maximum permeability of 600,000 to 1,200,000, coercive force of 0.002 to 0.005 oersted, and a hysteresis loss of less than 5 ergs per cu. cm. per cycle at B = 5000.

3-73. The Effect of Hydrostatic Pressure on the Fracture of Brittle Substances. P. W. Bridgman. *Journal of Applied Physics,* v. 18, Feb. 1947, p. 246-258.
Effects of pressures above 25,000 kg. per sq. cm. on the fracture of glass, Carboloy, beryllium, phosphor bronze,

Al_2O_3 (synthetic sapphire), pipestone (catlinite), and NaCl, under tension and compression. How it fits in with present theoretical concepts.

3-74. Outstanding Properties of the Magnesium-Zirconium Alloys. (Continued.) C. J. P. Ball. *Metallurgia,* v. 35, Feb. 1947, p. 211-214.

Magnesium-zirconium alloys have been developed which are relatively easy to work in addition to having exceptionally high-proof stress combined with high ultimate stress and elongation

3-75. Residual Currents and Related Phenomena of Hysteresis in Disks of Superconductive Metals. N. E. Alexeivsky. *Journal of Experimental & Theoretical Physics,* v. 16, no. 10, 1946, p. 870-877. (In Russian.)

Hysteresis of superconductive metals and formation of the intermediate state of conductivity is believed to be caused by the transition of the metal from the normal to the superconductive state in a magnetic field. This transition is shown to proceed by formation of nuclei, which develop into a striated structure, resulting in formation of a residual field.

3-76. Dependence of Magnetostriction of Nickel on Initial Crystal Structure and on Sequence of Application of Magnetic Field and Unilateral Elastic Stresses. Ia. S. Shur and A. S. Chochlov. *Journal of Experimental and Theoretical Physics,* v 16, no. 11, 1946, p. 1011-1020. (In Russian)

Changes in magnetostriction are influenced by the elastic oscillations induced by periodic application of cyclic stress in the presence of a magnetic field. The magnetostriction depends also on the initial crystal structure.

3-77. Zeitabhangige Erscheinungen in Eisen Enthaltenden Stoffen unter dem Einfluss Mechanischer und Magnetischer Krafte. (Time Dependent Phenomena in Iron-Containing Substances Under the Influence of Mechanical and Magnetic Forces.) J. L. Snoek. *Schweizer Archiv,* v. 13, Jan. 1947, p. 9-14.

Phenomena of dispersion and relaxation in ferromagnetic materials from point of view of elastic and magnetic aftereffect.

3-78. Copper-Manganese-Aluminum Alloys—Properties of Wrought Alpha Solid Solution Alloys. R. S. Dean, J. R. Long and T. R. Graham. *Metals Technology,* v. 14, Feb. 1947, T. P. No. 2142, 16 p.

The properties of alloys in the solid solution area of the system for compositions up to 50% Mn. Data for cold worked material (60% reduction by cold rolling) and for material annealed at two temperatures—1300 and 1200° F.

3-79. Principles of Magnesium Metallurgy. Williamson Wade Moss. *Light Metal Age,* v. 5, Feb. 1947, p. 8-15.

Physical properties presented in many tables.

3-80. Bearing Strength of Some Sand-Cast Magnesium Alloys. R. L. Moore. *National Advisory Committee for Aeronautics, Technical Note No. 1136,* Feb. 1947, 9 p.

Tests undertaken to determine the bearing strength characteristics of some magnesium alloy sand castings and the relation between these and AM403, AM260, and AM265 alloys. Data on compressive yield strengths and ultimate strengths in compression and shear are also included.

3-81. The Aging of Steel. B. D. Enlund. *Engineers' Digest (American Edition),* v. 4, Feb. 1947, p. 61-64.

Mechanical aging of mild steels; effect of aging on elongation, reduction of area, yield point, tensile strength and hardness; effect of aluminum additions. Aging properties depend not only on composition, but also on heat treatment and structural condition. Brittleness can be prevented by appropriate heat treatment. (Condensed from *Jernkontorets Annaler,* v. 130, Oct. 1946, p. 553-592.)

3-82. Magnetism. R. M. Bozorth. *Reviews of Modern Physics,* v. 19, Jan. 1947, p. 29-86.

General description of magnetism; permeable materials; permanent magnets; magnetization curves; stress and magnetostriction; properties of single crystals; temperature and the Curie point; effect of magnetization on other properties; magnetization in alternating fields; diamagnetism; paramagnetism; theory of ferromagnetism; measurement of magnetic quantities. (Reprinted from Encyclopaedia Britannica.)

3-83. Creeping Property of Soft Aluminum-Magnesium-Zinc Alloys at Temperatures from 90 to 180° C. F. Bollenrath and H. Grober. *Headquarters Air Materiel Command, Translation No. F-TS-1058-RE,* Feb. 1947, 15 p.

Alloys with varying zinc and magnesium contents have been tested to determine their creep at temperatures from 90 to 180° C. At the same time, other physical properties were checked and it was found that copper improved the creep performance. Alloys rich in magnesium have poor creep.

3-84. The Mechanism of the Embrittlement of Deoxidized Copper by Bismuth. E. Voce and A. P. C. Hallowes. *Journal of the Institute of Metals,* v. 73, Feb. 1947, p. 323-376

Mechanical properties of coppers containing up to 0.01% bismuth have been determined by means of notched-

bar tests at temperatures up to 850° C., and by notched-bar and reverse-bend tests after quenching from similar temperatures; the coppers tested by reverse bending contained up to 0.03% bismuth. Gives results of study and a short summary of the factors influencing the permissible bismuth content under practical conditions.

3-85. Ferromagnetism at Very High Frequencies. Part I. Magnetic Iron at 200 Megacycles. M. H. Johnson, G. T. Rado, and M. Maloof. *Physical Review*, v. 71, March 1, 1947, p. 322-323.

Variation of complex permeability of magnetic iron as a function of d.c. polarizing field at 200 megacycles in a half-wave coaxial resonator, part of whose central conductor was the metal under investigation.

3-86. The Magnetic Quenching of Superconductivity. M. J. Sienko and R. A. Ogg, Jr. *Physical Review*, v. 71, March 1, 1947, p. 319.

A mathematical relationship has been deduced from experimental data for the threshold curves of the "soft" superconductors Pb, Hg, Sn, In, Tl, CuS, Au_2Bi, Zn, and Cd. For these substances, the relationship departs from the parabolic shape for the "hard" elements and alloys.

3-87. Aluminum Alloys; Wrought R300 Series. *Machine Design*, v. 19, March 1947, p. 159-162.

Chemical analyses; properties; physical constants; heat treating cycles; bend radii; tempers; characteristics; applications; fabrication; resistance to corrosion; galvanic corrosion; material designations.

3-88. Creep Data for Nonferrous Metals and High Alloy Irons. Kelvin Sproule. *Metal Progress*, v. 51, March 1947, p. 440-B.

Stress-temperature curves prepared from published information are presented for 20 common metals and alloys.

3-89. Predicting Creep Strength of Metals. Kelvin Sproule. *Metal Progress*, v. 51, March 1947, p. 441-442.

Stress vs. temperature, plotted on semilog paper, give nearly straight lines. One known value for copper was used to predict other values by drawing a line roughly parallel to curves for other metals and alloys.

3-90. German Basic Bessemer Steels. *Metal Progress*, v. 51, March 1947, p. 462-463.

Brief account of tests made on H. P.N., "Hamborn, low-phosphorus, low-nitrogen steel", which is similar to the ordinary basic bessemer steel. Impact tests indicated that both rimming openhearth and killed basic bessemer steels had some advantages over rimming H.P.N. Low-temperature tests indicated a slight superiority of killed H.P.N. over basic bessemer killed with 0.44 lb. aluminum per ton in the as-rolled and normalized conditions, but the two steels are practically equivalent if the basic bessemer is killed with 0.66 lb. aluminum per ton. (Abstracted from "Manufacture of H.P.N. Steel in Belgium, Luxembourg and Germany", by T. P. Coleclough and J. Simpson. Report No. 345 of the Office of the Publication Board, Department of Commerce.)

3-91. An Economic Approach to Hardenability. Part I. D. I. Brown. *Iron Age*, v. 159, March 27, 1947, p. 42-47.

Graphical data compare various alloy steels and the cost per unit of hardenability obtained from these steels. The correlated data reveal some interesting features which can be useful in the selection of the most economical alloy steel for the purpose intended.

3-92. Hydrogen in Magnesium Alloys. *Metal Industry*, v. 70, March 7, 1947, p. 153.

Investigation shows that hydrogen porosity is only likely to be encountered if there is more hydrogen in the molten metal than can remain in solid solution when solidification occurs.

3-93. The Aging of High-Tensile Structural Steel. A. Fry and L. Kirschfeld. *Welding Journal*, v. 26, March 1947, p. 149s-152s.

Results of an investigation of failures in welded bridges which occurred in Germany and Belgium. It was found that normalizing of ST44 and ST52 high-tensile steels did not prevent development of brittleness and plastic deformation on aging. Experiments were also conducted using new specimens of the above steels. Recommends deoxidation of structural steels with aluminum. Yield-point acceptance tests do not give satisfactory assurance of safety. (Abstracted by D. Rosenthal from *VDI Zeitschrift*, v. 87, March 6, 1943, p. 123.)

3-94. Contribution a l'Etude des Fontes Spéciales a Haute Résistance Méchanique. (Contribution to the Study of Special Cast Irons Having High Mechanical Resistance.) Georges Delbart and Rubin Potaszkin. *Fonderie*, no. 12, 1946, p. 444-445; discussion, p. 445.

The mechanical properties of 12 varieties of cast iron prepared in a basic arc furnace, including low-carbon unalloyed, nickel-chromium and nickel-molybdenum cast iron.

3-95. An Economic Approach to Hardenability. Part II. D. I. Brown. *Iron Age*, v. 159, April 3, 1947, p. 53-55, 160.

The minimum H-band DI is a reliable, simple index in attacking the

problem of using the cheapest alloy which will satisfactorily make the part. Correlations of "cost-per-unit hardenability" data of various H-steels indicate some interesting economic concepts surrounding the use of alloys which are based primarily on hardenability.

3-96. Hardness of Magnesium Alloys. *Materials & Methods,* v. 25, March 1947, p. 121.

Studies made in Great Britain upon a number of the magnesium alloys indicate that hardness of the metal in the as-cast condition, after solution treatment, and in the fully heat treated state is related to the aluminum content. Formulas constructed were based upon empirical data so that hardness of a given alloy may be predicted within limits of the range of compositions studied.

3-97. Thermal Properties of Materials. *Materials & Methods,* v. 25, March 1947, p. 123.

Specific heat (solid and liquid), melting point, latent heat of fusion, boiling point, latent heat of vaporization of various metals, bakelite, resins and rubber.

3-98. The Effect of Changes of Condition of Carbides on Some Properties of Steel. J. B. Austin. *Industrial Heating,* v. 14, March 1947, p. 398-400, 402, 404, 406, 408.

Possible variations in the composition of cementite by variation in the ratio of the number of metal atoms to the number of carbon atoms, or through replacement of iron or carbon by another element. The effect of such variations on some of the properties of steel. (Condensation of the Campbell Memorial Lecture presented before the American Society for Metals.)

3-99. The Properties of Magnetic Metals and Powdered Iron Cores at High Frequencies. D. Moehring. *Headquarters Air Materiel Command Translation F-TS-1047-RE,* March 1947, 33 p.

Properties of magnetic metals and metallic mixtures when subjected to high-frequency currents.

3-100. Un Duralumin Amélioré. A Maturation Lente pour Rivets. (An Improved Duralumin. Slow Aging for Rivets.) Yves Bresson. *Revue de l'Aluminium,* Dec. 1946, p. 384-390.

A new alloy containing 2% Cu and traces of Si and Mg is proposed for rivets able to withstand cold-riveting. Properties and influence of various alloying elements.

3-101. The Resistance to Cavitation Erosion of Propeller Alloys. R. Beeching. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 90, Jan. 1947, p. 203-230; discussion, p. 230-245.

An investigation of the effect of composition upon resistance to cavitation erosion for several series of alloys. The composition ranges examined embraced all the more satisfactory types of alloy which have been used for propellers up to the present. Several ways of producing propeller alloys with combinations of mechanical properties superior to manganese bronze or aluminum bronze.

3-102. The Deformation of Tin-Base Bearing Alloys by Heating and Cooling. W. Boas and R. W. K. Honeycombe. *Council for Scientific & Industrial Research, Section of Tribophysics, Melbourne, Australia, Physical Metallurgy Report No. 2,* Jan. 28, 1947, 12 p.

The deformation of some tin-base alloys by cyclic thermal treatment. The results of cyclic thermal treatment of tin-base and lead-base bearings compared. The phenomenon of deformation is shown to be absent in the lead alloys. The significance of the results, as applied to both bearing practice and to metallurgy as a whole.

3-103. Transverse Magnetization in Ferromagnetic Crystals in Relation to Domain Structure. A. von Engel and M. S. Wills. *Proceedings of the Royal Society,* v. 188, Feb. 25, 1947, p. 464-484.

According to existing theory, the transverse component should increase as the field strength diminishes, whereas experimental results show that it becomes zero in very weak fields. To account for this, a simple treatment is developed which covers the whole range of field strength. The directions of magnetization of domains are treated as distributed continuously in angle, rather than restricted to a limited number of particular directions. By assuming that the proportion of the volume of domains magnetized in any direction is larger the lower the energy of magnetization in that direction, reasonable agreement with the experimental results is obtained.

3-104. Reflectivity of Steel. R. Weil *Nature,* v. 159, March 1, 1947, p. 305.

The reflective properties of two stainless steels at different temperatures and in different portions of the spectrum. The apparatus used and results.

3-105. Cast Iron and Steel. Ernest C. Pigott. *Iron and Steel,* v. 20, March 1947, p. 93-95.

Influence and commercial applications of constituent elements. Chromium in stainless steel and cast iron; cobalt; copper; hydrogen; lead. (To be continued.)

3-106. Room Temperature Tensile Properties of Aluminum Alloy Sheet Follow-

ing **Brief Elevated Temperature Exposure.** J. T Lapsley, A. E. Flanigan, W. F. Harper and J. E. Dorn. *Journal of the Aeronautical Sciences*, v. 14, March 1947, p. 148-154.

Above properties of nine types determined after elevated temperature exposure covering a range of times and temperatures suitable for forming.

3-107. Low-Cost Boron Elevates Steel Properties. *SAE Journal*, v. 55, April 1947, p. 65.

Work conducted for Army Ordnance showed substantially equal effectiveness for each of seven different forms of boron in improving the properties of 0.45% carbon, 1.50% manganese steel. (Summary of report soon to be available from S.A.E.'s special publication department.)

3-108. Selection of Carbon Steels for Metallizing. *Metco News*, v. 3, April 1947, p. 11-12.

The necessity of considering the properties of the deposited metals rather than those of the metals in other forms. Graphs show ultimate strength and ultimate strain vs. carbon content.

3-109. The Flow of Metals at Elevated Temperatures. Part II. J. H. Hollomon and J. D. Lubahn. *General Electric Review*, v. 50, April 1947, p. 44-50.

The general equation relating stress, strain, strain rate, and temperature was applied to cases in which temperature or strain rate is not constant during deformation. Results of experiments on effect of strain rate and temperature histories, and on the relationship between tensile and creep test data. Certain unsolved problems for future research.

3-110. Discussion of Paper on an Investigation of the Effect of Welding on the Transition Temperature of Navy High-Tensile Low-Alloy Steels. G. F. Comstock. *Welding Journal*, v. 26, April 1947, p. 251s-252s.

Results presented in paper by G. G. Luther and others in October 1946 issue are charted in such a way as to indicate the effect of titanium and other alloys on the weldability of Navy high-tensile steel.

3-111. High Chromium-Irons. H. D. Newell. *Metal Progress*, v. 51, April 1947, p. 617-626.

The nonhardenable commercial alloys containing from 12% to 24% chromium; physical and mechanical properties; structural features; embrittlement; applications.

3-112. Evaluating High Heat Properties of Steels. Herbert Dobkin. *Steel*, v. 120, April 21, 1947, p. 86-87, 120, 122, 124.

The significance and methods of measuring elevated-temperature properties of various steels; the types of materials generally used in high-temperature applications.

3-113. "Hot Hard" High Speed Steel. H. G. Johnstin. *Steel*, v. 120, April 21, 1947, p. 98, 100.

Requisite wear and heat resistance imperative for successful cutting of materials of higher hardness at elevated temperatures developed in service.

3-114. On Wear Resistance of Gray Irons. *Nickel Cast Iron News*, v. 18, Second Quarter 1947, p. 4-5.

The wear resistance of various types, and classification of the gray irons into eight structural and alloy types in order of their wear resistance. Micrographs.

3-115. Cohesive Strength and the Creep of Copper and Monel. *Metallurgia*, v. 35, March 1947, p. 234, 238.

Letter from D. J. McAdam, Jr., of the U. S. National Bureau of Standards criticizes E. Voce's review of the literature in "Copper and Copper Alloys," published in December 1946 issue, especially as regards a paper by McAdam, Geil, and Woodard. Mr. Voce's reply.

3-116. The Development of a High Creep Strength Austenitic Steel for Gas Turbines. D. A. Oliver and G. T. Harris. *Metallurgia*, v. 35, March 1947, p. 235-238.

Some of the development work on turbine disk and blade problems, particularly the development of G.18B.

3-117. The Deformation of the Tin-Base Bearing Alloys by Heating and Cooling. W. Boas and R. W. K. Honeycombe. *Journal of the Institute of Metals*, v. 73, March 1947, p. 433-444.

Deformation of some tin-base alloys by cyclic thermal treatment. A comparison is made of tin-base and lead-base bearings on cyclic thermal treatment, and it is shown that the phenomenon is absent in alloys based on the cubic metal lead. The significance of these results as applied to bearing practice and some general metallurgical implications.

3-118. The Mechanical Properties of Some Extruded Zinc-Base Alloys. A. S. Kenneford. *Journal of the Institute of Metals*, v. 73, March 1947, p. 445-470.

Effects of additions of aluminum and copper with or without small amounts of magnesium, manganese, nickel, lithium, and silver on the mechanical properties of experimentally extruded high-purity zinc. Additions of cadmium, antimony, silicon, and bismuth were detrimental or without effect. Small amounts of nickel and manganese gave improved strength with some loss of ductility; silver had a similar effect but caused no loss of ductility. Other observations.

3-119. Carbon-Molybdenum Steel for Steam Pipes. L. Rotherham. *Alloy Metals Review,* v. 5, March 1947, p. 2-5.

The properties of carbon-molybdenum steel which make it suitable for high-temperature steam service correlated from a study of the available literature. The information discussed under the following headings: high-temperature service requirements; creep resistance; ductility; service failures; stability.

3-120. Cementation de Certains Alliages Sidérurgiques par le Glucinium. (Cementation of Certain Ferrous Alloys With Beryllium.) Joseph Laissus. *Comptes Rendus,* v. 224, March 10, 1947, p. 742-743.

Beryllium was investigated as a cementation agent for stainless steels containing 13% Cr and for austenitic 18-8 steels. Included in the study were mechanism of diffusion and influence of time and temperature on hardness of the product. Initial hardness of both alloys was about 195 kg. per sq. mm. The treatment increased it to 642 kg. per sq. mm. for 13% Cr stainless, and to 772 kg. per sq. mm. for 18-8.

3-121. Wear of Splined Shafts. S. H. Frederick. *Machinery (London),* v. 70, March 20, 1947, p. 289-290.

How and why wear takes place in air turbine driving units.

3-122. Resistance of Contact Between Metals, and Between Metals and Carbon Materials. Yu. V. Baimkoff. *Engineers' Digest (American Edition),* v. 4, April 1947, p. 164.

The effects of pressure and of heating to 300° C. for 120 hr. on 21 different contact material combinations. The results are in tabular form. The information is of special value for electrochemical and electrometallurgical plants. (Condensed from 3rd Technical-Scientific Conference of the Kalinin Polytechnic Institute, Leningrad, Russia, Sept. 1944, p. 50.)

3-123. New Strong, Nonmagnetic Spring Material Has High Corrosion Resistance. *Materials & Methods,* v. 25, April 1947, p. 94-95.

Elgin watch-spring material is strong, relatively hard, nonmagnetic, highly resistant to corrosion, nonsetting, and otherwise superior to high quality carbon steel spring materials. Comparison of the properties of Elgiloy with those of the carbon steel spring material.

3-124. Elastic Limits and Permanent Set in Springs. Part II. *Mainspring,* v. 11, April 1947, p. 2-5.

Properties of commercial steel springs which are not hardened, and of the many nonferrous spring materials.

3-125. Copper-Manganese-Zinc Alloys—Physical Properties of Wrought Copper-Rich Alloys. R. S. Dean, J. R. Long, and T. R. Graham. *Metals Technology,* v. 14, April 1947, T. P. 2183, 13 p.

One phase of the Bureau of Mines program on electrolytic manganese included a general review of the system and the establishment of the physical properties of copper-manganese-zinc alloys, using electrolytic manganese, with particular emphasis on compositions within the alpha solid-solution area. The present report is a summary of the tensile properties of wrought alloys in the form of sheet and rod stock for one condition of cold work and one annealing temperature.

3-126. An Investigation of a Thermal Ice-Prevention System for a Cargo Airplane. Part VIII. Metallurgical Examination of the Wing Leading-Edge Structure After 225 Hours of Flight Operation of the Thermal System. Maxwell Harris and Bernard A. Schlaff. *National Advisory Committee for Aeronautics Technical Note no. 1235,* April 1947, 9 p.

Specimens of Alclad 24S-T aluminum alloy sheet taken from the thermal system were examined for the extent of corrosion and for changes in tensile strength as a result of aging of the aluminum alloy by the elevated temperatures. Examination indicated only minor corrosion and no impairment of tensile strength. 15 ref.

3-127. De Ontwikkeling Van De Kruipvaste Staalsoorten. (Development of Heat Resistant Steels.) A. J. Zuithoff. *Metalen,* v. 1, April 1947, p. 133-138.

The development of various heat resistant steels with special attention to the improvement in strength at high temperatures during the past five years of alloys for turbosuperchargers and aircraft gas turbines.

3-128. Temper Brittleness in Alloy Steels. *Engineer,* v. 183, April 4, 1947, p. 286-287.

A critical review of several papers. Major attention is devoted to A.S.M.'s 1946 Preprint no. 16 by Pellini and Queneau, "Development of Temper Brittleness in Alloy Steels".

3-129. Precipitation Hardening. Part II. L. Sanderson. *Chemical Age,* v. 56, April 5, 1947, p. 412-414.

Modifications occurring in electrical conductivity and magnetic properties of alloys when precipitation takes place, and the effect of aging on physical properties. (To be continued.)

3-130. Lead-Base Babbitt Alloys. Part I. Physical and Corrosion Properties. Henry P. George. *Product Engineering,* v 18, May 1947, p. 118-121.

Mechanical and corrosion properties of ten typical lead-base babbitt alloys are compared to those of a standard

tin-base alloy. Values for hardness, compressive strength, resistance to distortion under impact, and creep resistance. Typical microstructures. Corrosion rates in acidified oil.

3-131. Influenza delle Impurita Normali (Cu, Zn, Ti) sulle Caratteristiche dell' Aluminio per Uso Elettrico. (Influence of the Normal Impurities (Cu, Zn, Ti) on the Properties of Aluminum for Electrical Uses.) C. Panseri and M. Monticelli. *Alluminio,* v. 15, Jan-Feb. 1947, p. 5-12.

Three series of aluminum wires having varying percentages of impurities were tested, and it was found that titanium decreased the electrical conductivity of aluminum more than copper or zinc. Copper had the greatest effect on mechanical properties.

3-132. The Relationship Between Fatigue and Stress Concentration. R. B. Heywood. *Aircraft Engineering,* v. 19, March 1947, p. 81-84.

Sensitivity index is commonly used to relate fatigue stress-concentration factor to elastic stress concentration. A simpler hypothesis is claimed to be a more reliable guide to fatigue behavior in notches. It assumes that elastic stress-concentration factor gives the reduction in the fatigue strength due to the notch, but because of the local nature of the stress concentration, the endurance limit is increased according to a simple law. This increase in the fatigue strength depends on the smallness of the notch. 15 ref.

3-133. Forming Dies. *Automobile Engineer,* v. 37, April 1947, p. 139-140.

Properties and applications of the zinc-base alloy, Kirksite.

3-134. Temperature Dependence of Magnetic Susceptibility of Annealed and Cold Worked Copper. T. S. Hutchison and J. Reekie. *Nature,* v. 159, April 19, 1947, p. 537-538.

Recent investigations of the variation with temperature of the magnetic susceptibility of annealed and cold worked copper have shown a different temperature dependence for the two treatments. Theoretical basis for the difference.

3-135. Hydrogen Overpotential and the Thermionic Work Function. J. O'M. Bockris. *Nature,* v. 159, April 19, 1947, p. 539-540.

Recent work permits a re-evaluation of the relations between the hydrogen overpotential at various cathodes and the position of the cathode material in the periodic table.

3-136. Thermal Expansion of Co-Fe-Cr Series Alloys and New Alloy "Stainless-Invar". Hakaru Masumoto. *Headquarters Air Material Command Translation F-TS-706-RE,* April 1947, 14 p.

Procedures and results of thermal expansion measurements of ternary Co-Fe-Cr alloys, containing 50% or more of Co. Why stainless invar, Co-Fe-Cr, has a smaller thermal expansion rate than Fe-Co alloys in spite of its anticorrosive and magnetic properties. (From *Nippon Kinzokugakkaishi,* v. 4, no. 4, April 20, 1938, 6 p. Reprint.)

3-137. Magnesium. The Metal of Tomorrow. T. R. B. Watson. *Canadian Metals & Metallurgical Industries,* v. 10, April 1947, p. 13-17, 32.

Properties and applications of the metal and its alloys in lightweight construction.

3-138. A Metallurgical Investigation of Large Forged Disks of Low-Carbon N-155 Alloy. Howard C. Cross and J. W. Freeman. *National Advisory Committee for Aeronautics Technical Note No. 1230,* April 1947, 20 p.

Results of a study of the room-temperature, 1200, 1350, and 1500° F. properties of three large forged disks of low-carbon N-155 alloy. It contains about 20% each of chromium, nickel, and cobalt; and from 0.6 to 3% of each of silicon, columbium, manganese, tungsten, and molybdenum.

3-139. The Failure of Metals by Fatigue. *Metallurgia,* v. 35, April 1947, p. 289-293.

Brief abstracts of some of the papers read at Symposium on the Failure of Metals by Fatigue, held under the auspices of the Faculty of Engineering, University of Melbourne, Australia.

3-140. Flame Hardened Steel. S. T. Jazwinski. *Steel,* v. 120, May 12, 1947, p. 108-109, 146.

In relatively new type of air hardening steel the allotropic transformation is lowered by control of chemical analysis and, as a result, air cooling is sufficient to produce high hardness in depth. Only hardening tool required is an oxy-acetylene torch. Steel is produced in acid openhearth and electric-arc furnace. Steel shows high physical properties and even in high ultimate strength is very ductile. Tables show hardness against drawing temperatures and comparison of hardness between water-quenched and air-quenched surfaces. The tests were made on samples from the same heat.

3-141. The Emissivity of Hot Metals in the Infrared. Derek J. Price. *Proceedings of the Physical Society,* v. 59, Jan. 1, 1947, p. 118-131.

A specially designed vacuum-light, water-jacketed furnace for the measurement of the emissivity of incandescent metals. Results are given for pure platinum, iron, molybdenum, copper and nickel. A split-cylinder type of comparison black-body was used and its efficiency compared with a spherical standard. 26 ref.

3-142. The Temperature Variation of the Emissivity of Metals in the Near Infrared. Derek J. Price. *Proceedings of the Physical Society,* v. 59, Jan. 1, 1947, p. 131-138.

Evidence analyzed for the existence of a wave length peculiar to each metal, for which the temperature coefficient of emissivity is zero. Further experimental data are submitted in support, and it is shown that the appearance of such a phenomenon would explain many of the divergent results obtained for the temperature variation of emissivity in the visible region, besides providing a new series of characteristic wave lengths for metals. 21 ref.

3-143. The Hardened and Tempered Microstructure of High Speed Toolsteel as a Factor in Tool Performance. W. H. Wooding. *Transactions of the American Society of Mechanical Engineers,* v. 69, May 1947, p. 281-306.

Hardened and tempered metallurgical characteristics of a large number of tools representing various types of high speed steels were studied to determine the probable cause for variation in tool life during conduct of continuous roughing-cut performance tests. Studies included the austenitic grain size, hardened and tempered microstructure, the Rockwell hardness of the finished tools, and the Shepherd hardened fracture grain size, as well as comparison of these properties with tool performance.

3-144. Changes in Volume During Magnetization and the "Invar" Alloys. Ulrich Dehlinger. *Battelle Translation from Zeitschrift fur Metallkunde,* v. 28, no. 7, 1936, p. 194-196. 10 p.

In the previous paper by the same author, the progress of the exchange integral was established as a function of the atomic spacing for a series of metals on the basis of the comparison of momentum of ferromagnetic saturation of different crystal lattices. It is shown that the above fact may explain the volume increase during magnetization and also the properties of the Invar iron-nickel alloys.

3-145. Abnormal Creep in Carbon Steels. J. Glen. *Journal of the Iron and Steel Institute,* v. 155, April 1947, p. 501-512.

Short-time creep tests at a stress of 17,600 psi and a temperature of 450° C., on a series of low-carbon steels containing 0.4 to 1.5% of manganese, 0.01 to 0.15% of silicon, and 0.00 to 0.11% of molybdenum, with varying amounts of aluminum up to 3 lb. per ton, show that manganese, silicon, and molybdenum within the limits examined reduce the creep rate, and that the abnormal creep resulting from aluminum additions is reduced considerably by these elements. In production casts of basic openhearth steel it is shown that, with proper control, aluminum may be used as a deoxidizer, provided that the steel remains coarse-grained as measured by the McQuaid-Ehn test.

3-146. Electroplating and Cathodic Pickling as Causes of Hydrogen Embrittlement. Carl A. Zapffe and M. Eleanor Haslem. *Wire and Wire Products,* v. 22, May 1947, p. 351-356, 379-381.

A new bend test said to be especially suited for measuring brittleness of wire specimens. Effects of pickling time, bath temperature, and bath impurities on hydrogen embrittlement during cathodic pickling. Hydrogen absorption is identical for acid or for alkaline electrolytes. Quantitative evaluation of embrittlement caused by chromium plating and by cadmium plating. Both the latter are shown to cause embrittlement equaling or exceeding that caused by cathodic pickling.

3-147. Fracture of Metals. *Metal Industry,* v. 70, May 2, 1947, p. 307-308.

Metallurgical and mathematical viewpoints of fracture and relative merits of each.

3-148. Materials Work Sheet. Meehanite. *Machine Design,* v. 19, May 1947, p. 147-150.

Types available; characteristics; applications; fabrication; heat treatments; resistance to corrosion; material designations.

3-149. High-Temperature Characteristics of 17 Alloys at 1200 and 1350° F. J. W. Freeman, F. B. Rote, and A. E. White. *National Advisory Committee for Aeronautics Wartime Report W-93,* March 1944, 106 p.

Results of a study of the rupture-test characteristics of 13 wrought and 4 cast alloys which have promise for service in exhaust-gas turbines. The results are not too conclusive because of the fact that differences in fabrication procedure and heat treatment often cause more variation than wide differences in chemical composition.

3-150. Copper Addition Contaminants. Effect on Mechanical Properties of Gray Cast Iron. K. E. Rose and C. H. Lorig. *American Foundryman,* v. 11, May 1947, p 83-93.

Results of experiments undertaken to determine what harmful effects might result from use of copper-base alloys and the extent to which they can be safely employed as a source of copper for gray cast iron.

3-151. Temper Brittleness. R. H. Greaves. *Iron and Steel,* v. 20, May 1947, p. 175-178.

A critical review of recent French investigations.

3-152. Cast Iron and Steel. (Continued.) Ernest C. Pigott. *Iron and Steel,* v. 20, May 1947, p. 181-183.

Properties and applications of the nickel steels and cast irons.

3-153. Average Ultimate Strength of Materials. *Materials & Methods,* v. 25, May 1947, p. 119.

Table of various metals and their forming based upon physical experiments conducted in the laboratories of E. W. Bliss Co.

3-154. Properties and Fabrication of Aluminum Alloys. *Materials & Methods,* v. 25 May 1947, p. 121.

Comparison with other metals; precautions to be observed in fabricating.

3-155. The Magnetic Quenching of Superconductivity. J. W. Stout. *Physical Review,* v. 71, May 15, 1947, p. 741.

Disagrees with Sienko and Ogg's expression for the destruction of superconductivity of "soft" superconductors such as Pb, Hg, Sn, In, Tl, CuS, Au_2Bi, Zn and Cd.

3-156. Cast Jominy Tests for Determining Hardenability. H. B. Wishart. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 214-221.

An experimental program indicated that good agreement exists between the hardenability results from the Jominy specimens from forged billet sections and those from cast specimens obtained on the pouring platform during teeming. In view of results obtained, direct-cast-specimen hardenabilities are now used for preliminary control of heats at Gary Steel Works.

3-157. Engineering Properties of Heat Treated Cast-Irons. J. S. Vanick. *Foundry Trade Journal,* v. 82, May 15, 1947, p. 53-56.

Standard practices of heat treating and properties produced by this treatment. (From paper presented at the Cleveland Meeting of the American Foundrymen's Association.)

3-158. Hot Shortness of the Aluminum-Silicon Alloys of Commercial Purity. A. R. E. Singer and P. H. Jennings. *Engineering,* v. 163, May 2, 1947, p. 369-371.

An extensive study of the mechanism of hot shortness and its dependence on composition and mechanical properties at high temperatures. (Condensed from paper presented before the Institute of Metals, March 5, 1947.)

3-159. Boron in Medium Carbon Steel. G. P. Contractor and J. S. Vatchagandhy. *Metal Treatment,* v. 14, Spring 1947, p. 3-19.

Transformation temperatures, tensile and fatigue properties, Izod impact values, creep resistance, case-hardening behavior, and hardenability of a series of medium-carbon steels. 19 ref.

3-160. Low-Temperature Physics and the Theory of Metals. E. B. Mendoza. *Metal Treatment,* v. 14, Spring 1947, p. 20-28.

Relationships of the above clarified for the metallurgist.

3-161. Alcomax II Permanent Magnet Alloy. *Edgar Allen News,* v. 25, May 1947, p. 826-827.

An anisotropic alloy that has the highest field strength obtainable from any permanent magnet system.

3-162. Effect of Sulphur in Cast Steel. *Industrial Heating,* v. 14, May 1947, p. 784.

The more important effects.

3-163. Light Alloy Piston Materials. A. Schofield and L. M. Wyatt. *Institution of Automobile Engineers Journal,* v. 15, May 1947, p. 251-294.

Properties of the various materials; how to choose the proper alloy for various requirements; methods of fabrication; and conditions of temperature and loads for different automobile, aircraft, and diesel engines.

3-164. Titanium—Some Properties and Applications. H. W. Greenwood. *Metallurgia,* v. 36, May 1947, p. 44.

A brief discussion.

3-165. Brittleness in Metals. Part I. Embrittlement of Deoxidized Copper by Bismuth. *Metal Industry,* v. 70, May 16, 1947, p. 361, 365.

Possible reasons for the above phenomenon.

3-166. "Spoiling" of Tungsten Steel. K. Hoselitz and M. McCaig. *Nature,* v. 159, May 24, 1947, p. 710.

Experiments substantiate theory that the spoiling—loss of coercive force on keeping at 950 to 1000° C. prior to hardening—of tungsten magnet steel is caused by the formation of a separate carbide phase which reduces amount of tungsten and carbon available to promote hardening.

3-167. Titanium and Zirconium. W. H. Waggaman and E. A. Gee. *Federal Science Progress,* v. 1, June 1947, p. 18-19.

Properties, methods of manufacture, occurrence of raw materials, and applications.

3-168. Behavior of Metal Cavity Liners in Shaped Explosive Charges. George B. Clark and Walter H. Bruckner. *Mining Technology,* v. 11, May 1947, T.P. 2158, 12 p.

The behavior of the metal in cavity liners when they are subjected to intense pressures exerted when the explosive charge is detonated. Physical and mechanical properties of the metals were found to have a marked effect

upon their performance as a cavity-liner material. Study of the microstructure of a collapsed cavity liner resulted in development of a theory explaining the phenomenon of jet-formation.

3-169. Effect of Prior Tensile Strain on Fracture. Edward Saibel. *Metals Technology,* v. 14, June 1947, T.P. 2186, 8 p.

The above effect is investigated in a theoretical manner from the point of view developed by the author in his thermodynamic theory of the fracture of metals. Results are compared with experimental findings and a rational interpretation is given to work that shows the variation of fracture stress with prior tensile strain.

3-170. The Dependence of the Magnetostriction of Nickel Upon Initial Magnetic Texture and Sequence of Applying Magnetic Field and Unidirectional Elastic Tension. J. Shur and A. Khokhlov. *Journal of Physics (U.S.S.R.),* v. 11, no. 1, 1947, p. 77-84. (In English.)

3-171. Hardenability. *Iron and Steel,* v. 20, May 23, 1947, p. 281-286.

An extended discussion on the recent symposium. (Special Report No. 36 of the Iron and Steel Industrial Research Council.)

3-172. High Creep Strength Austenitic Gas-Turbine Forgings. D. A. Oliver and G. T. Harris. *Engineer,* v. 183, May 30, 1947, p. 468-469.

Characteristics required for gas-turbine use. The properties and chemical compositions of five British steels. Special problems in the melting, casting, forging, heat treating, machining, inspection, and testing of solid rotor forgings. (To be continued.) (Condensed from paper presented to Institute of Marine Engineers, April 1947.)

3-173. Internal Friction in Engineering Materials. Andrew Gemant. *Journal of Applied Mechanics,* v. 14 *(Transactions A.S.M.E.,* v. 69), June 1947, p. A164.

Discussion of paper by I. M. Robertson and A. J. Yorgiadis, published in Sept. 1946 issue and authors' reply.

3-174. Zirconium and Its Applications. W. M. Raynor. *Mining and Metallurgy,* v. 28, June 1947, p. 284-285.

A brief discussion.

3-175. Wrought Aluminum Alloys. R Chadwick. *Metal Industry,* v. 70, June 6, 1947, p. 415-418.

Characteristics of commercial wrought aluminum alloys, with the object of giving the user of light alloys a clear picture of the choice available.

3-176. Characteristics of Three High-Temperature Alloys. J. B. Henry, Jr. *Iron Age,* v. 159, June 12, 1947, p. 58-64.

Three special alloys, developed during the war by Allegheny Ludlum, are compared from the standpoints of cost, physical properties, and methods of fabrication, heat treatment, and machining. Use of the vibration of tuning-fork samples for modulus of elasticity measurements.

3-177. Hardest Man-Made Material. *American Machinist,* v. 91, June 19, 1947, p. 122-124.

Characteristics and typical uses of boron carbide.

3-178. British High Temperature Steels for Gas Turbines. C. Cyril Hall. *Steel,* v. 120, June 23, 1947, p. 101, 132.

Properties of the alloys.

3-179. Wrought Aluminum Alloys. R. Chadwick. *Metal Industry,* v. 70, June 13, 1947, p. 435-438; June 20, 1947, p. 455-458; June 27, 1947, p. 484-486.

Characteristics and relation of properties to composition and constitution. 27 ref.

3-180. Brittleness in Metals. Part III. *Metal Industry,* v. 70, June 13, 1947, p. 439.

Effect of bismuth in gold, and of sulphur in nickel.

3-181. Super-Conductivity. E. Schroter. *Metal Industry,* v. 70, June 13, 1947, p. 444-445.

A review of recent research on the above property of both metals and nonmetals in the neighborhood of absolute zero. (Translated and condensed from recent issue of *Zentralblatt für die Osterr Industrie und Technik.)*

3-182. Ferromagnetic Resonance at Microwave Frequencies. W. A. Yager and R. M. Bozorth. *Physical Review,* v. 72, July 1, 1947, p. 80-82.

Experiments designed to test Kittel's theory and to evaluate the gyromagnetic ratio.

3-183. Metallurgical Considerations in High Temperature Steam Piping Systems. J. J. Kanter. *Proceedings of the Midwest Power Conference,* v. 9, 1947, p. 236-240.

3-184. Materials as a Consideration in Modern Boiler Feed Pump Construction. H. L. Ross. *Proceedings of the Midwest Power Conference,* v. 9, 1947, p. 241-244.

Causes and remedies for corrosion-erosion, and properties of different metals and alloys used for boiler-feed pumps.

3-185. Boron as an Alloying Element in Steel. D. E. R. Hughes. *Engineering Materials,* v. 5, Feb-April 1947, p. 14-18.

A review.

3-186. Damping Capacity, Strain Hardening and Fatigue. R. F. Hanstock. *Proceedings of the Physical Society,* v. 59, March 1, 1947, p. 275-287.

An electromagnetic method for exciting torsional resonance vibrations.

For some alloys of aluminum, notably binary alloys containing 5% and 11% of magnesium, vibrational strains of sufficient magnitude to cause fatigue cracks can be developed at frequencies of the order of 1 kc. per sec. Fatigue failure of the two binary alloys containing magnesium is shown to be preceded by strain hardening.

3-187. Beryllium and Beryllium Bronze (Beryllium Copper). Robert Gadeau. *Microtechnic (English Section),* v. 1, April 1947, p. 43-46.

Surveys the beryllium industry and the properties and uses of pure beryllium and of its various alloys. To be continued. (Translated from the French.)

3-188. Ligas Ferro-Manganes. Acos-Manganeses Austeniticos. (Ferromanganese Alloys. Austenitic Manganese Steels.) Clovis Bradaschia. *Boletim da Associacao Brasileira de Metais,* v. 3, April 1947, p. 251-272.

A general study of Fe-Mn and Fe-C-Mn alloys and a particular study of Hatfield steels covering composition, properties, treatment, and principal uses. 14 ref.

3-189. Fragmentation of Shell Cases. N. F. Mott. *Proceedings of the Royal Society,* v. 189, May 1, 1947, p. 300-308.

Paper is the result of attempts to find a theoretical basis for the prediction of the distribution in weight of the fragments of shell or bomb cases after detonation of the filling. Little attempt is made to relate the theory to experiment. An expression is derived for length of the average fragment. This is shown to depend on radius and velocity of the case at the moment of explosion, and on mechanical properties of the metal.

3-190. Hardenability. W. Steven. *Iron and Steel,* v. 20, June 1947, p. 299-305.

A survey of the recently published "Symposium on the Hardenability of Steel" (Iron and Steel Institute, Special Report No. 36.)

3-191. Cast Iron and Steel; Influence and Commercial Applications of Constituent Elements. (Continued.) Ernest C. Pigott. *Iron and Steel,* v. 20, June 1947, p. 307-309.

Concludes section on nickel alloys; influence of niobium, nitrogen, oxygen, and phosphorus. (To be continued.)

3-192. Effect of Dissolved Gas on the Hot Tearing of Aluminum Casting Alloys. D. C. G. Lees. *Foundry Trade Journal,* v. 82, June 5, 1947, p. 117-118.

Paper presented to the Institute of Metals.

3-193. Creep and Some Creep Resisting Alloys. G. Burns. *Metallurgia,* v. 36, June 1947, p. 63-65.

The development of materials to withstand high temperatures and stresses for use in gas turbines.

3-194. Magnesium-Cerium-Zirconium Alloys. A. J. Murphy and R. J. M. Payne. *Engineering,* v. 163, June 6, 1947, p. 485-487.

Details of experimental work on the properties of the above alloys at elevated temperatures. (Condensed from "Magnesium-Cerium-Zirconium Alloys: Properties at Elevated Temperatures", presented at meeting of Institute of Metals, March 6, 1947.)

3-195. Postwar Steels. *Chemical Age,* v. 56, June 7, 1947, p. 744-745.

Steels and their coatings.

3-196. Magnetic Dispersion of Ferric Oxide. J. B. Birks. *Nature,* v. 159, June 7, 1947, p. 775-776.

Measurements of magnetic properties previously reported are now extended to wave lengths up to 60 cm.

3-197. Hardness and Hardenability in Carbon and Alloy Steels. *Product Engineering,* v. 18, July 1947, p. 141-143.

Difference between hardness and hardenability. Method of running standard end-quench hardenability tests. Effects of carbon and other alloys on hardness and hardenability. Typical hardenability curves.

3-198. Modified Type 405 Stainless Iron; a Satisfactory Lining for Petroleum Refinery Vessels. Merrill A. Scheil. *Metal Progress,* v. 52, July 1947, p. 91-102.

Results of extensive tests on various types of chromium steels. Penetration during immersion in boiling 65% HNO_3; corrosion and pitting after 6250 hr. in petroleum refinery service; hardening temperatures as an indication of weldability; and long-time stability. Investigations of six cases of embrittlement in service indicate that five were outside the required limits of chemical analysis. Only one was an example of stress-corrosion.

3-199. New Deep Hardening Carburizing Steels. *Iron Age,* v. 160, July 24, 1947, p. 62-64.

Properties of new steels announced by Carnegie-Illinois.

3-200. Influence of Cobalt on Properties of High Speed Steel. N. T. Gudtsov and K. M. Gelfand. *Bulletin of the Academy of Sciences of U.S.S.R. (Section of Technical Sciences),* no. 1, 1947, p. 93-104. (In Russian.)

Influence of a cobalt addition on properties of plain carbon steels has been investigated but the data are not applicable to high speed steels of complex composition. Investigations to determine the mechanism of the favorable effect of cobalt on cutting properties. 5 ref.

3-201. Correlation of Conditions of Deformation During Application of Pressure to Metals. S. I. Gubkin. *Bulletin of the Academy of Sciences of U.S.S.R. (Section of Technical Sciences)*, no. 1, 1947, p. 117-123. (In Russian.)

Attempts to show that the so-called law of F. Kick, concerning the proportional resistance (or similarity) of metals, is invalid.

3-202. The Influence of the Rate of Deformation on the Cold Brittleness of Steel. Part III. F. F. Vitman. *Journal of Technical Physics (U.S.S.R.)*, v. 17, no. 2, 1947, p. 77-86. (In Russian.)

Experimental results confirm a previously reported exponential relationship. Tests were made on four different carbon steels and one alloy steel, before and after different heat treatments. A specially developed, rotating impact-test apparatus was used.

3-203. Generalization of Elastic-Plastic Deformation. Ia. A. Macheret. *Journal of Technical Physics (U.S.S.R.)*, v. 17, no. 2, 1947, p. 87-102. (In Russian.)

A mathematical development. Deformation of the general type is considered to be a combination of three types: instantaneous, "hereditary," and residual. An equation is derived which combines the general type of deformation with stress, under certain conditions.

3-204. Surface Tension of Metals. A. G. Samoilavich. *Journal of Physical Chemistry (U.S.S.R.)*, v. 21, no. 2, 1947, p. 161-162. (In Russian.)

A mathematical analysis shows that the expression proposed for surface tension does not depend upon the model which was used for its development.

3-205. Mumetal—A High-Permeability Alloy. N. G. Neuweiler. *Microtecnic (English Section)*, v. 1, Feb. 1947, p. 15-17.

Magnetic and electrical properties, uses, and testing methods for new iron-nickel alloy.

3-206. Sur l'Ansotropie Optique des Siliciures de Fer, de Manganese et de Nickel. (Optical Anisotropy of Silicon Alloys of Iron, Manganese, and Nickel.) Theophile Cambon. *Comptes Rendus*, v. 224, April 14, 1947, p. 1112-1114.

Characteristics of diverse optically anisotropic phases of these alloys.

3-207. La Fabrication des Lingotières d'Aciérie. (Production of Steel Ingot Molds.) Alphonse Charmeau. *Fonderie*, April 1947, p. 601-611.

Results of an investigation of the influence of various factors on the properties of ingot molds, and results of the influence of titanium-vanadium and chromium-titanium on mold quality.

3-208. Frottement Interieur des Metaux et des Alliages Ferromagnetiques. (Internal Friction of Ferromagnetic Metals and Alloys.) Christian Boulanger. *Comptes Rendus*, v. 224, May 5, 1947, p. 1286-1288.

Magnetization of metals and alloys decreases their internal friction. A field of 100 oersteds, sufficient to saturate ferronickel containing 46% Ni, decreased the internal friction 35 times, and in pure nickel, 100 times. This phenomenon may have caused some of the disagreements in the experimental results reported by different authors.

3-209. Comparing Plastics. C. E. Staff, J. M. Hill, and H. M. Quackenbos, Jr. *Machine Design*, v. 19, July 1947, p. 112-116.

Mechanical properties are compared with those of the common structural metals. 18 ref.

3-210. Carbon and Graphite. *Machine Design*, v. 19, July 1947, p. 157-160.

Forms available; properties; characteristics; applications; fabrication; methods of fastening; design tips.

3-211. Drawing Die Problems and Formulas. James Walker. *Tool Engineer*, v. 18, July 1947, p. 29-34.

Uses, properties, and heat treating of toolsteels.

3-212. The Physics of Sheet Steel. (Continued.) G. C. Richer. *Sheet Metal Industries*, v. 24, July 1947, p. 1361-1365.

Structures resulting from rolling. Magnetic properties. 13 ref. (To be continued.)

3-213. Influence de la Grosseur de la Cristallisation, des Constituants hors de Solution Solide et des Impuretés sur la Forgeabilité des Alliages Légers. (Influence of the Size of Crystallization, the Constituents Not in Solid Solution, and Impurities on the Forgeability of Light Alloys.) Paul Bastien. *Métaux et Corrosion*, v. 21, Aug-Sept. 1946, p. 105-119.

Forgeability of new alloys was determined by the combined use of static and dynamic bend tests at various temperatures. The study of plastic deformation of various binary alloys led to the formulation of general laws for forgeability.

3-214. The Fatigue Characteristics of Copper-Nickel-Zinc and Phosphor Bronze Strip in Bending Under Conditions of Unsymmetrical Loading. G. R. Gohn and W. C. Ellis. *American Society for Testing Materials Preprint 25*, 1947, 9 p.

Fatigue tests in bending on two nonferrous materials in strip form under conditions of unsymmetrical loading. The machine and test methods developed for making such tests. S-N curves and other curves showing the effect of mean stress on the range of stress in unsymmetrical repeated bending. 10 ref.

3-215. An Experimental Study of the Propagation of Plastic Deformation Under Conditions of Longitudinal Impact. P. E. Duwez and D. S. Clark. *American Society for Testing Materials Preprint 31*, 1947, 21 p.

The theory of plastic-strain propagation with reference to longitudinal impact. Special impact-testing equipment furnishes data for verification of the theory. Tests in tension on long wires and on specimens with a gage length of 8 in. together with the results of some tests made in compression. The effect of release of loading and reflection of plastic-strain waves on plastic-strain distribution. The concept of critical velocity. The anomalous behavior of material for which there is a yield point. Results indicate satisfactory agreement between theory and experiment. 10 ref.

3-216. Plastic Flow of a Magnesium Alloy Under Biaxial Stresses. D. M. Cunningham, E. G. Thomsen, and J. E. Dorn. *American Society for Testing Materials Preprint 33*, 1947, 8 p.

Results of an experimental evaluation of the plastic flow of AZ61 magnesium-alloy extrusions under varying ratios of biaxial stressing. 21 ref.

3-217. Welding or Sticking of Electrical Contacts. Erie I. Shobert, II. *American Society for Testing Materials Preprint 96*, 1947, 15 p.

A method for evaluating the welding and sticking characteristics of contacts was developed. Consistent results were obtained in six different laboratories. Theory and a formula for the relationship between current on the testing machine and physical properties of the contact materials.

3-218. Corrosion Resistant Metals for Valves and Seats on Heavy-Duty Engines. A. T. Colwell. *Society of Automotive Engineers Preprint*, 1947, 21 p.

The properties of various high-temperature, corrosion resistant alloys. How valve life can be improved by correct design principles, including use of valve-seat inserts.

3-219. An Investigation of the High-Temperature Properties of Chromium-Base Alloys at 1350° F. J. W. Freeman, E. E. Reynolds, and A. E. White. *National Advisory Committee for Aeronautics Technical Note No. 1314*, May 1947, 21 p.

Chromium-base alloys had rupture strengths as high as 73,000 and 54,500 psi., respectively, for fracture in 100 and 1000 hr. at 1350° F. The highest similar values published for other alloys are in the order of 50,000 and 40,000 psi. The most promising chromium-base alloy at 1350° F. for buckets for gas turbines appears to be 60Cr-25Fe-15Mo with less than 0.05% carbon and from 0.5 to 0.7% silicon.

3-220. Les Principales Maladies de la Malleable a Coeur Noir et leur Diagnostic Micrographique. (Principal Defects of Black Heart Cast Iron and Their Micrographic Examination. Concluded.) Henri Laplanche. *Fonderie*, March 1947, p 564-581.

Many charts, photomicrographs, and a table of defects, structures, and possible causes.

3-221. Temperature Dependence of Coercive Force in Monocrystals of Transformer Steel. Ia. S. Shur. *Journal of Experimental & Theoretical Physics (U.S.S.R.)*, v. 17, no. 3, 1947, p. 238-239. (In Russian.)

The temperature dependence of coercive force was determined on a single crystal of the above material at 420 and 195° C.

3-222. Abnormality in the Thermal Expansion of Iron-Platinum Alloys. Hakaru Masumoto and Takero Kobayashi. *Headquarters Air Materiel Command, Wright Field, Translation F-TS-1878-RE*, May 1947, 7 p.

Thermal expansion of the entire series was measured. The alloy containing 52.5 to 53.5% Pt had a negative coefficient of expansion over a wide temperature range. The maximum value of this coefficient reached -3.5×10^{-5} at $-40°$ for 52.5% Pt. Results show that theory proposed by one of the authors is qualitatively correct. (From report dated Nov. 1945.)

3-223. On the Law of Deformation of Amorphous and Polycrystalline Bodies. G. Gurlevich. *Comptes Rendus de l'Academie des Sciences de l'U.R.S.S.*, v. 55, no 6, 1947, p. 493-496. (In English.)

A relationship is derived for the dependence of yield stress on rate of deformation and for dependence of rate of deformation on the load. It was found to be valid experimentally for a wide range of rigidities for materials of diverse structures, such as different plastic film materials, aluminum, lead, and copper wire. 12 ref.

3-224. Investigations Concerning the Suitability of Heat Resisting Materials for Exhaust-Gas Turbine Blades. H. Cornelius, W. Bungardt and F. Bollenrath. *Headquarters Air Materiel Command, Wright Field, Translation F-TS-1862-RE*, June 1947, 17 p.

Twenty-two austenitic ferrous and nonferrous metals were examined at temperatures from 600 to 1000° C. to determine their suitability for exhaust-gas turbine blades. Test results for tensile strength, thermal expansion, specific weight, elasticity coefficient, forge-scaling resistivity, and change of physical properties under high temperatures. (Translated from report of *Deutsche Versuchsanstalt für Luftfahrt, Berlin-Adlershof.*)

3-225. Hydrogen and Transformation Characteristics in Steel. J. H. Andrew, H. Lee, H. K. Lloyd, and N. Stephenson. *Journal of the Iron and Steel Institute*, v. 156, June 1947, p. 208-260.

A comprehensive study of hydrogen evolution from 22 different steels. The effects of alloying elements and crack formation in isothermally treated specimens. Hydrogen embrittlement was found to vary with thermal treatment. It is closely associated with hairline cracks, and hydrogen diffusivity and solubility are the controlling factors for both.

3-226. Beryllium and Beryllium Bronze (Beryllium Copper). (Continued.) Robert Gadeau. *Microtecnic (English Section)*, v. 1, June 1947, p. 69-71.

Application to windows for X-ray tubes; analysis of beryllium alloys; various alloys other than beryllium copper. (To be continued.) (Translated from the French. For illustrations, see *French Section*, p. 163-167.)

3-227. Low-Alloy, High-Strength Steels. *Materials & Methods*, v. 26, July 1947, p 101.

Eight or ten steels presented. Introductory material; general characteristics; corrosion resistance; notch toughness; joining and working; design considerations; applications; and economics. 13 ref.

3-228. Lead Improves Aluminum-Magnesium Alloys. *Materials & Methods*, v. 26, July 1947, p. 126-127.

Properties resulting from addition of up to 2.5% Pb to an aluminum alloy containing 8% Mg. (Translated and condensed from *Aluminum-Archiv*, v. 24, 1939.)

3-229. Gas Turbine Forgings. (Concluded.) D. A. Oliver and G. T. Harris. *Iron and Steel*, v. 20, July 1947, p. 339-344.

Development of British G.18B and R.20 high creep strength austenitic steels and their creep strength properties. 13 ref.

3-230. Toolsteels. *Machinery Lloyd (Overseas Edition)*, v. 19, July 5, 1947, p. 76-86.

Properties of the various types; working and heat treating high speed steels, carbon toolsteels, modified carbon, and shock-resisting toolsteels.

3-231. Molybdenum Alpha Irons; a New Range of High Duty Alloys. *Alloy Metals Review*, v. 5, June 1947, p. 2-6.

Recent investigations have shown that low-carbon, higher molybdenum steels retard hardenability, and have led to the development of a series of compositions possessing special properties. Potential applications of this new type of material.

3-232. Bearing Properties of 24S-T Sheet and Shear Strength of 24S-T Rivets at Elevated Temperatures. A. E. Flanigan, L. F. Tedsen, and J. E. Dorn. *Transactions of American Society for Metals*, v. 38, 1947, p. 789-804; discussion, p 804-806.

Shear strength and bearing properties were determined after exposure to temperatures up to 375° F., for periods ranging from ¼ hr. to 1000 hr.

3-233. Cast Heat Resistant Alloys of the 16% Chromium-35% Nickel Type. Howard S. Avery and Norman A. Matthews. *Transactions of American Society for Metals*, v. 38, 1947, p. 957-1015; discussion, p. 1015-1022.

The "HT"-type cast alloy with data covering mechanical properties at room temperature, as cast and after aging at 1400° F.; elevated temperature strength and ductility from 1400 to 2200° F.; stress-rupture properties; creep strength from 1400 to 2150° F.; suggested working stresses; magnetic permeability; thermal expansion; elastic modulus at 1400 to 1800° F.; resistance to carburization and hot gas corrosion; and the effect of temperature fluctuations on creep rates. The relationship between yield strength and hindered contraction stresses in connection with thermal fatigue. Pertinent comparisons with the "HH" (26% Cr, 12% Ni) alloys are included. 21 ref.

3-234. Fatigue Testing of "Zh.I" Stainless Steel at High Temperatures. M. J. Sichikov, Z. D. Vishnevetskii, and D. L. Ginberg. *Boiler and Turbine Construction (U.S.S.R.)*, Feb. 1947, p. 22-24. (In Russian.)

Results of an investigation of the above steel (13 to 14% Cr; 0.58% Ni; 0.43% Si; 0.30% Mn; 0.12% C; 0.026% P; and 0.018% S) at different temperatures from 20 to 600° C.

3-235. Correlation of Shrinkage Cracks in Castings With the Composition of the Alloy. A. A. Bochvar and S. A. Sviderskaia. *Bulletin of the Academy of Sciences of the U.S.S.R. (Section of Technical Sciences)*, no. 3, 1947, p. 349-355. (In Russian.)

On a series of aluminum-copper and aluminum-silicon alloys it was demonstrated that maximum hot shortness of aluminum-copper alloys corresponds to a 2% copper content and in the aluminum-silicon alloys, to a silicon content under 1.6%. In the maximum hot shortness range, shrinkage stresses under 3 psi. can cause hot tears.

3-236. Conductivity of Metallic Surfaces at Microwave Frequencies. E. Maxwell. *Journal of Applied Physics*, v. 18, July 1947, p. 629-638.

Methods consist of either measuring the transmission loss in a long wave guide, or in measuring the Q's of

resonant cavities. Both methods were applied to measurements at 1.25 cm. Results for a number of metals.

3-237. Mechanical Properties of Cast Low-Alloy Steels. Malcolm F. Hawkes. *Transactions of American Society for Metals,* v. 39, 1947, p. 1-40; discussion, p. 41-44.

Hardenability, tensile and impact property data, grain size, inclusion ratings, and other characteristics were determined on 32 cast alloy steels of the N.E. type. Nine grades of steels made by the acid openhearth, acid electric, basic openhearth, and basic electric processes were studied. It is concluded that cast N.E. alloy steels with properties comparing favorably with the older cast and wrought alloy steels can be produced readily.

3-238. The Effect of Composition on the Fatigue Strength of Decarburized Steel. L. R. Jackson and T. E. Pochapsky. *Transactions of American Society for Metals,* v. 39, 1947, p. 45-57; discussion, p. 57-60.

Fatigue strength of the decarburized layers is determined by the strength of the ferrite in the decarburized zone and can be controlled by the composition of the ferrite. Decarburization has relatively less effect on fatigue strength at high stresses than at low stresses. Tests were run on S.A.E. 2340, 4140, and 5140, in which the effect of surface decarburization on the fatigue strength was explored at two hardness levels both in the presence and in the absence of notches. Results indicate that the core hardness does have an effect on the fatigue strength of decarburized test pieces.

3-239. Electrolytic Conductivity as a Method for Studying Electronic Transitions in Elements—Application to Iron, Nickel and Cobalt. W. R. Ham and C. H. Samans. *Transactions of American Society for Metals,* v. 39, 1947, p. 73-99; discussion, p. 99-108.

New method is based upon electrolytic conductivity in a glassy carrier. Results for six different iron glasses as well as for two nickel glasses and one cobalt glass. As in previous hydrogen diffusion studies, the temperatures at which breaks occur in log resistance vs. T-curves for iron are represented within the limits of experimental accuracy, by Ritz-type formulas. Data are given for the various transition temperatures. 10 ref.

3-240. The Ductility of Metals Under General Conditions of Stress and Strain. John E. Dorn and E. G. Thomsen. *Transactions of American Society for Metals,* v. 39, 1947, p. 741-772.

Method for calculating the limiting strains at fracture under combined stresses assumes that the metal is homogeneous, isotropic, and that the plastic deformation is isovolumetric. A simple relationship is derived for a generalized workhardening curve. The theory deviates up to about 10% from the experimental facts. Numerous examples of the correlation between predicted and experimentally obtained strains at fracture. 11 ref.

3-241. New Wrought Zinc Alloys Containing Small Amounts of Beryllium. R. H. Harrington. *Transactions of American Society for Metals,* v. 39, 1947, p. 773-783; discussion, p. 783-787.

Because of inherently high rates of creep, commercial zinc alloys are usually tested at the rate of extension of ¼-in. per min. A commercial grade of copper-hardened zinc gave a proportional limit of 2200 psi, a tensile strength of 24,700 psi., and an elongation of 52%. By the same method zinc alloys containing copper and beryllium give proportional limits of 15,000 to 16,000 psi, 0.5% offset yield strengths 30,000 to 35,000 psi., tensile strengths of 40,000 to 46,000 psi., and elongations of 20 to 30%. They age-harden at 175° C. and do not recrystallize below 200° C. Addition of beryllium also improves corrosion resistance.

3-242. Boron in Steel. Murray C. Udy. *Metal Progress,* v. 52, Aug. 1947, p. 257-264.

Results of some of the many investigations conducted during the war by various governmental and private agencies.

3-243. Selecting Spring Materials. F. P. Zimmerli. *Steel,* v. 121, Aug. 11, 1947, p. 78-79, 108, 111, 114, 116, 120, 122, 125, 128.

Some diversified flat and wire materials used by the mechanical or cold forming and by the heavy or hot forming spring industries.

3-244. The Effect of Carbon Content on the Hardenability of Boron Steels. G. D. Rahrer and C. D. Armstrong. *American Society for Metals Preprint No. 2,* 1947, 14 p. (To be published in *Transactions* for 1948.)

With boron additions of 0.0006% to 0.0045%, only carbon content and intensity of deoxidation affect the hardenability factor for boron to a demonstrable degree. Steel must be well deoxidized in order to attain the potential increase in hardenability from a boron addition.

3-245. Beryllium in Magnesium Casting Alloys. Jay R. Burns. *American Society for Metals Preprint No. 10,* 1947. (To be published in *Transactions* for 1948.)

Marked burning inhibition and grain coarsening were noted, and beryllium additions were also effective in removing iron and manganese from magne-

sium. Various grain refining techniques were attempted with partial success. A relationship is established between grain size and mechanical properties of AZ92 alloy, solution heat treated.

3-246. Cast Heat Resistant Alloys of the 26% Cr-20% Ni Type. Part I. Howard S. Avery and C. R. Wilks. *American Society for Metals Preprint No. 16,* 1947. (To be published in *Transactions* for 1948.)

Data cover: mechanical properties at room temperature; stress-rupture and creep properties from 1400 to 2000° F.; thermal expansion; resistance to carburization and hot gas corrosion; and several miscellaneous properties. The HK grade is suggested for general hot-gas corrosion resistance. It is also well suited for carburizing service when fortified with about 2% silicon.

3-247. The Cobalt-Chromium J Alloy at 1350 to 1800° F. Nicholas J. Grant. *American Society for Metals Preprint No. 17,* 1947. (To be published in *Transactions* for 1948.)

Properties and effects of content variations for a new cast alloy designated as "J" alloy which is based on Vitallium as a starting point.

3-248. Mechanical Properties of Metals at Low Temperatures; A Survey. L. Seigle and R. M. Brick. *American Society for Metals Preprint No. 19,* 1947. (To be published in *Transactions* for 1948.)

The literature is classified on the basis of the polycrystalline and the single crystal forms. It is critically evaluated.

3-249. Influence of Metallurgical Factors on the Mechanical Properties of Steel. S. A. Herres and C. H. Lorig. *American Society for Metals Preprint No. 20,* 1947. (To be published in *Transactions* for 1948.)

Results obtained in several series of experiments carried out during the war at Watertown Arsenal laboratory and Battelle Memorial Institute. The principal factors considered were amount, type, and distribution of nonmetallic inclusions; amount, type, and distribution of carbides; grain size; and precipitation-hardening reactions.

3-250. The Fatigue Strength of Binary Ferrites. E. Epremian and E. F. Nippes. *American Society for Metals Preprint No. 21,* 1947. (To be published in *Transactions* for 1948.)

Tests in the Quinlan pneumatic fatigue machine indicate that the relative order of effectiveness of alloying elements in binary solid solution on the endurance limit of ferrite is Ti, Mo, Si, Mn, Ni, Co, and Cr. The effectiveness varies inversely with the extent of their solid solubility in iron. The changes in the power requirements to maintain a bar at constant stress during a fatigue test were found to be caused by changes in the damping capacity due to cold work. The occurrence of fatigue failure is defined by a decrease in the natural frequency of the sample.

3-251. The Effect of Silicon on the Properties of Cast Carbon and Carbon-Molybdenum Steels. N. A. Ziegler, W. L. Meinhart, and J. R. Goldsmith. *American Society for Metals Preprint No. 29,* 1947. (To be published in *Transactions* for 1948.)

Another step in the authors work to isolate one variable at a time and to determine its effect on thermal characteristics, physical properties, weldability, and hardenability of cast carbon and low-alloy steels.

3-252. Les Ecarts de la Loi de Hooke. Tentative en vue de leur Determination Experimentale. (Deviations from Hooke's Law; Attempts to Determine Them Experimentally.) Adrien Jaquerod. *Revue de Metallurgie,* v. 43, Sept-Oct. 1946, p. 257-264; discussion, p. 264.

Certain nonferromagnetic alloys in the cold worked condition have a Coulomb modulus which varies parabolically with the stress. Reheating increases the modulus. Hooke's law does not seem to be obeyed as a limiting law by invar alloys. Pure nickel presents many anomalies.

3-253. Influence de la Composition Chimique et de la Structure de Certains Alliages Metalliques sur leur Capacite d'Amortissement. (Influence of Chemical Composition and Structure of Certain Metallic Alloys on Their Damping Capacity.) Leon Guillet, Jr. *Revue de Metallurgie,* v. 43, Sept-Oct. 1946, p. 265-267; discussion, p. 267.

Results of experiments discussed and shown graphically.

3-254. Hardenability in Relation to Steel and Cast Iron—Its Meaning and Measurement. Albert Portevin. *Engineers' Digest (American Edition),* v. 4, July 1947, p. 306-308.

Hardenability of steels and of test pieces and hardenability tests. (To be continued.) (Condensed from *Iron and Coal Trades Review,* v. 154, April 18, 1947, p. 683-688; April 25, 1947, p. 719-724; May 2, 1947, p. 769-773.)

3-255. Precipitation-Hardened Alloys for Gas Turbine Service. Part I. Metallurgical Considerations. Part II. Design and Application Data. Howard Scott and R. B. Gordon. *Transactions of the A.S.M.E.,* v. 69, Aug. 1947, p. 583-591; p. 593-599.

Selection of base alloy and hardening agent, choice of heat treatment

for optimum properties, and the use of short-time tensile and creep rupture tests in evaluating the effects of composition and heat treatment variables. The creep rupture properties of K42B, Discaloy, Refractaloy 26, and Refractaloy 70 in the form of design curves for each alloy at one or more temperatures.

3-256. **Nickel-Chromium Alloys for Gas Turbine Service.** C. A. Crawford. *Transactions of the A.S.M.E.*, v. 69, Aug. 1947, p 609-612.

Two nickel-base alloys for gas turbine applications at temperatures up to 1500° F. and possibly higher. Inconel X is a wrought material, readily forged and welded, with high rupture strength at all temperatures. The second alloy is a cast material primarily suited for extended service applications requiring high creep resistance in the neighborhood of 1500° F.

3-257. **Haynes Alloys for High-Temperature Service.** W. O. Sweeny. *Transactions of the A.S.M.E.*, v. 69, Aug. 1947, p. 569-580; discussion, p. 580-581.

Physical properties of various alloys in the forged and cast form. Applications.

3-258. **Second Hatfield Memorial Lecture; Steels for Use at Elevated Temperatures.** C. Sykes. *Journal of the Iron and Steel Institute*, v. 156, July 1947, p. 321-338.

Properties of large forgings in ferritic steel, steels of the R.ex78 type, and large austenitic steel forgings.

3-259. **Bibliography on Creep and Heat Resisting Steels (Covering the Period 1937 to 1947).** *Journal of the Iron and Steel Institute*, v. 156, July 1947, p. 338-369.

Bibliography compiled in connection with paper on steels for use at elevated temperatures, by C. Sykes.

3-260. **The Fatigue Strength of Some Tin-Antimony-Copper and Other Tin-Base Alloys.** P. G. Forrester, L. T. Greenfield and R. Duckett. *Metallurgia*, v 36, July 1947, p. 113-117.

Fatigue strengths of these alloys increase with increasing antimony and copper, but the effect of solid-solution antimony and eutectic copper is much greater than of either element in the form of massive compounds.

3-261. **Carbon-Molybdenum Steel for Steam Pipes.** L. Rotherham. *Metallurgia*, v. 36, July 1947, p. 154-156.

In relation to carbon steel, the carbon-molybdenum steel has advantageous creep resistance in the higher steam temperature ranges. On the other hand it has a lower ductility, which makes care essential in its fabrication and installation. Incorporation of 0.5% chromium in the carbon-molybdenum steel is suggested.

3-262. **Choosing Heat Resisting Materials.** E. Barber. *Machinery Lloyd (Overseas Edition)*, v. 19, July 19, 1947, p. 87-90.

Problems involved, and conditions and applications to be taken into consideration in choosing heat resisting materials.

3-263. **A Metallurgical Investigation of a Large Forged Disk of Low-Carbon N-155 Alloy.** J. W. Freeman and H. C. Cross. *National Advisory Committee for Aeronautics Wartime Report W-103*, Dec. 1945, 41 p.

The alloy contained 21.66% Cr, 19.40% Ni, 19.02% Co, 2.76% Mo, 1.90% W, 1.74% Mn, 0.79% Cb, 0.37% Si, 0.15% C, and 0.14% N_2, and was studied in the hot forged and stress-relieved condition by means of stress-rupture and creep tests for periods up to 2000 hr. at 1200, 1350, and 1500° F. Short-time tensile test, impact test, and time vs. total deformation characteristics.

3-264. **Ductile, Brittle, and Boundary Cracks in Notched Impact Bars.** D. M. Zagonodskikh. *Journal of Technical Physics (U.S.S.R.)*, v. 17, no. 3, 1947, p. 389-390. (In Russian.)

Ductile, brittle, and boundary cracks observed in fractured notched-impact specimens. The structural location and causes of each type of crack. Inclusions are believed responsible for brittle fracture and boundary cracks.

3-265. **Expansion of Some Alloys During Crystallization.** A. A. Bochvar, S. A. Sviderskaia, and E. K. Korbut. *Bulletin of the Academy of Sciences of U.S.S.R. (Section of Technical Sciences)*, no. 4, 1947, p. 409-417. (In Russian.)

Many alloys (such as binary alloys of Cu-Zn, Cu-Sn, Al-Cu, and Al-Zn) exhibit initial expansion during solidification, preliminary to contraction which takes place upon further cooling. The extent of initial expansion has a direct relationship to the width of the liquidus-solidus zone. No measurable expansion of pure metals was observed.

3-266. **On the Temperature Magnetic Hysteresis in Ferromagnetic Materials.** J. S. Schur and V. I. Drozhina. *Comptes Rendus de l'Academie des Sciences de l'U.R.S.S.*, v. 56, no. 1, 1947, p. 39-42. (In English.)

Experiments on nickel and silicon steel (4% Si). Two causes of temperature magnetic hysteresis are difference in lattice structure and difference in magnetic structure. The second is emphasized since the first has already been studied in detail.

3-267. On the Notch Sensitivity of High-Strength Alloys. J. B. Friedmann and T. A. Volodina. *Comptes Rendus de l'Academie des Sciences de l'U.R.S.S.,* v. 55, no. 8, 1947, p. 713-716. (In English.)

The notch sensitivities of duralumin and high-strength aluminum alloy bars are investigated to find out whether the high notch sensitivity of alloy steels is a property of other alloys as well. Effects of different heat treatments. Notched aluminum-alloy specimens show diminishing ductility with increasing ultimate strength.

3-268. Some Experiments on Superconductivity at Radio-Frequencies. B. G. Lasarev, A. A. Galkin and V. I. Khotkevich. *Comptes Rendus de l'Academie des Sciences de l'U.R.S.S.,* v. 55, no. 9, 1947, p. 805-807. (In English.)

Tin and thallium wires 0.1 to 0.2 mm. in diameter were submitted to frequencies up to 2×10^7 cycles per sec. The time of relaxation for thallium at 2° K. is less than half the cycle for the highest frequency applied, that is. less than 2×10^{-8} sec.

3-269. Generalized Mechanical Properties of Solid Bodies. J. B. Friedmann. *Comptes Rendus de l'Academie des Sciences de l'U.R.S.S.,* v. 55, no. 9, 1947, p. 817-820. (In English.)

Relationships between mode of loading and flow and shearing strength curves for several metastable alloys. Generalized curves (which previously had been verified only for metals practically in an equilibrium state) are valid for duralumin, high-strength Al-Zn-Mg alloy, and austenitic 18-8 steels 14 ref.

3-270. Recherches sur les Propriétés Elastiques des Métaux a l'Aide des Deux Pendules en Resonance d'Oberbeck. (Research on the Elastic Properties of Metals Using Two Pendulums in Oberbeck's Resonance.) Constantin Salceanu. *Comptes Rendus,* v. 224, June 23, 1947, p. 1756-1758.

Two pendulums bound together by wires of the different metals were used to determine their elastic properties. The increasing tension of each metal measured at definite intervals: torsion constant of the wires at constant tension.

3-271. Applications a la Mesure du Coefficient de Rigidité des Métaux de la Methode des Pendules de Resonance. (Applications of Measurements of the Coefficient of Rigidity of Metals Using Resonance Pendulums.) Constantin Salceanu. *Comptes Rendus,* v. 224, June 30, 1947, p. 1810-1811.

Further work on the resonance of two pendulums joined by metal wires. Relationship between the time measured and the coefficients of rigidity of the metals used. Data are useful in determining modifications in the elasticity of metals after heat treatment.

3-272. Resistance-Temperature Relation and Thermo-Electric Properties of Uranium. Andrew I. Dahl and Milton S. Van Dusen. *Journal of Research of the National Bureau of Standards,* v. 39, July 1947, p. 53-58.

The resistance-temperature relation showed sharp breaks at about 650 and 770° C., indicating the existence of transformation points. The very rapid change in resistance occurred at a somewhat higher temperature on heating than on cooling. Only slight irregularities in the thermo-electric properties were noted in the region of the transformation points.

3-273. Influence of Boron on Some Properties of Experimental and Commercial Steels. Thomas G. Digges and Fred M. Reinhart. *Journal of Research of the National Bureau of Standards,* v. 39, July 1947, p. 67-131.

Influence of simple and complex intensifiers on the cleanliness, structure, austenite, and McQuaid-Ehn grain sizes, hardenability, notch toughness at room and low temperatures and tensile properties of "split" heats of both experimental and commercial steels Effects of deoxidation on these properties and the influence of boron on transformation temperatures and weldability and the recovery of boron on remelting. 27 ref.

3-274. Production Data Sheet. *Production Engineering & Management,* v. 20, Aug. 1947, p. 77.

Composition and properties of zinc alloys for die casting.

3-275. High Temperature Disk Forging Developments for Aircraft Gas Turbines. L. B. Fonda. *Steel Processing,* v. 33, Aug. 1947, p. 469-473, 486, 491, 500-502.

Type I-40 turbine wheel, with its buckets, comprises the high temperature rotating parts of the jet engine powering the P-80 airplane. Bursting tests on turbine wheel blanks and bucketed turbine wheels. Circumstances behind this investigation, the type of equipment used, the various alloys and forging practices investigated, and comparison of the results.

3-276. The Stainless Steels—Introductory. Lester F. Spencer. *Steel Processing,* v. 33, Aug. 1947, p. 474-478, 508.

Compositions in current use. Three principal classifications are alloys that contain chromium as the major alloying element (A.I.S.I. 400 series); alloys that contain both chromium and nickel (A.I.S.I. 300 series); and, alloys that contain other elements such as aluminum, tungsten, titanium.

3-277. Superalloys. Part I. Walter G. Hildorf. *Western Machinery and Steel World,* v. 38, Aug. 1947, p. 88-91.

Requirements for superalloys for high-temperature use in gas turbines. (To be continued.)

3-278. High Alloy Tool and Die Steels. Josef Bronner. *Machinery Lloyd (Overseas Edition),* v. 19, Aug. 2, 1947, p. 103-106.

Properties of carbon, chromium, cobalt, manganese, molybdenum, nickel, silicon, tungsten, and vanadium tool-steels.

3-279. Internal Stresses Due to Anisotropic Thermal Expansion of Pure Metals and Alloys. W. Boas and R. W. K. Honeycombe. *Council for Scientific & Industrial Research, Melbourne, Australia, Serial No. A. 151, Physical Metallurgy Report No. 4,* May 6, 1947, 10 p.

Behavior of tin-base and lead-base bearings when subjected to repeated cycles of heating and cooling. Even after a very small number of cycles between 30 and 150° C. the tin-base bearings showed marked depressions on the surface. The lead-base bearings showed no signs of surface cracks even after 200 cycles. Experiments on pure metals showed that lead, aluminum, and magnesium were not deformed, while cadmium and zinc behaved similar to tin.

3-280. Thermal Disorder in Metals and Alloys. A. H. Cottrell. *Metal Treatment,* v. 14, Summer 1947, p. 93-102, 110.

An introduction to the methods of statistical thermodynamics, illustrating the wide range of problems to which these methods are applicable. 13 ref.

3-281. Probabilities of Magnetization. G. C. Richer. *Nature,* v. 160, Aug. 23, 1947, p. 256.

In an earlier analysis of the B-H curves of polycrystalline iron it was shown that a simple "trichotomy" of the steep part of the curves could lead to useful estimates of the quantitative distribution of operative lattice orientation along any given direction in polycrystalline sheet material. Results of subsequent work on this phenomenon and the build-up of the technical magnetization curve.

3-282. Ten New Magnetic Materials in Review. Alex E. Javitz. *Electrical Manufacturing,* v. 40, Sept. 1947, p. 74-78, 194, 196, 198, 200, 202, 204, 206, 208, 210.

Summary of available data on both "soft" and "hard" or permanent materials. Increasing flexibility of design possibilities offered. Data on Alnico not included.

3-283. Aluminum-Clad Light Alloys. *Engineering Materials and Processes,* v. 5, Aug. 1947, p. 90-91.

Composition and properties of the various British, American, German, Swiss, French, and Italian "Alclads", under their respective trade names.

3-284. Beryllium and Its Alloys. G. Fitz-Gerald-Lee. *Engineering Materials and Processes,* v. 5, Aug. 1947, p. 100-101.

Review of properties and applications.

3-285. A Study of the Relationship Between Resistance of Metals or Amorphous Bodies to Plastic Deformation and the Speed and Temperature of Deformation. L. D. Sokolov. *Journal of Technical Physics (U.S.S.R.),* v. 17, no. 5, 1947, p. 543-548. (In Russian.)

Static and dynamic compression tests were made on cylindrical specimens of lead, tin, zinc, aluminum, copper, nickel, pitch, and glass at various temperatures; and true stresses were determined for various testing conditions.

3-286. The Electrical Resistance of Fe-Cr-C Alloys at High Temperatures. M. E. Blanter. *Journal of Technical Physics (U.S.S.R.),* v. 17, no. 5, 1947, p. 549-556. (In Russian.)

A study of the electrical resistance of a series of chromium steels at temperatures ranging from 20 to 1200° C. Effects of variations in chromium and carbon in the austenitic as well as in the pearlitic state. An anomalous drop in electrical resistance upon transformation from pearlite to austenite and upon solution of excess carbides in the austenite was caused by the presence of the cubic carbide $(CrFe)_{23}C_6$. The solution temperatures of excess carbides depend on their crystal structure. 16 ref.

3-287. The Adiabatic Temperature Changes Accompanying the Magnetization of Cobalt in Low and Moderate Fields. L. F. Bates and A. S. Edmondson. *Proceedings of the Physical Society,* v. 59, May 1, 1947, p. 329-343.

The new method devised for the measurement of the small thermal changes which are associated with the step-by-step changes in the magnetization of ferromagnetic materials in fields not exceeding a few hundred oersteds was used in the study of annealed and unannealed cobalt in the form of heavy wire. The observed changes are relatively large and in striking contrast to those observed with iron and nickel. An attempt is made to explain them on the basis of modern concepts in ferromagnetism.

3-288. A New Cutting Alloy. L. Sanderson. *Machinery Lloyd (Overseas Edition),* v. 19, Aug. 16, 1947, p. 95-97.

Properties and application of Tantung (45 to 50% Co; 27 to 32% Cr, 14 to 19% W, 2 to 7% Ta and Cb; 2 to 4% C; 2 to 5% Fe, and 1 to 3% Mn).

3-289. Thermal Conductivity of Aluminum; Solid and Liquid States. C. C. Bidwell and C. L. Hogan. *Journal of Applied Physics,* v. 18, Aug. 1947, p. 776-779.

An improved technique. The thermal conductivity decreases with rise of temperature as it does for lead, tin, and zinc.

3-290. Machine Design's Materials Work Sheet: Standard Steels. Wrought A.I.S.I. Types. Part I. *Machine Design,* v. 19, Sept. 1947, p. 157-167.

A condensed handbook-type presentation of information concerning general characteristics; fatigue strength; impact strength; wear resistance; properties as hot rolled and cold drawn; properties when hardened and tempered; tempered hardness to strength relationship; hardness obtainable; hardenability and its determination; applications of each type; fabrication; heat treatments; and corrosion resistance.

3-291. Surging of Valve Springs. *Automobile Engineer,* v. 37, July 1947, p. 265-270.

A critical survey of the literature on the failure of internal-combustion-engine valve springs.

3-292. Cobalt-Base and Nickel-Base Alloys for Ultrahigh Temperature. F. S. Badger, Jr., and F. C. Kroft, Jr. *Metal Progress,* v. 52, Sept. 1947, p. 394-402.

Correlates results of high-temperature tests on a number of alloys studied by various agencies for the National Defense Research Council, and used during the war for critical portions of high-temperature equipment, notably gas turbines for aircraft-engine superchargers and for main propulsion plants for high-speed airplanes.

3-293. Titanium in Type 405 Stainless Iron. George F. Comstock. *Metal Progress,* v. 52, Sept. 1947, p. 392-393.

Discussion of "Modified Type 405 Stainless Iron", by Merrill A. Scheil (July issue). Doubts that excess titanium caused embrittlement during service at 700 to 1000° F. If any of the ferrite-stabilizing elements (Cr, Mo, Al, Ti, or Cb) are present in amounts near the maximum permissible, a little of any other of them may cause embrittlement during service at these temperatures.

3-294. The Strength of Welded Joints at Low Temperatures and the Selection and Treatment of Steels Suitable for Welded Structures. Otto Graf. *Welding Journal,* v. 26, Sept. 1947, p. 508s-517s. Translated from the German.

Low temperatures (such as during the winter, or in contact with liquid air) have resulted in sudden failure of a number of welded structures. Development of satisfactory tests for steels to be used under these conditions, and recommended methods for production of satisfactory steels and for stress-relief heat treatment of structures. 16 ref.

3-295. The Physics of Sheet Steel. (Continued.) G. C. Richer. *Sheet Metal Industries,* v. 24, Sept. 1947, p. 1783-1785.

Magnetostriction and the stages of magnetization. (To be continued.)

3-296. Etude Statistique des Variations de la Résilience de l'Acier Moulé au Carbone, de Nuance Mi-Douce Elaboré au Four Electrique a Arc en Marche Basique. (Statistical Study of Variations in Resilience of Cast Carbon Steel, Semi-Mild Type, Prepared in a Basic Electric Arc Furnace.) Paul Bastien and Louis Alanore. *Revue de Métallurgie,* v. 43, Nov-Dec. 1946, p. 289-296.

The standard resilience of semi-mild cast carbon steel from a basic electric arc furnace decreased 0.25 kg. per sq. mm. when the breaking load increased 1 kg. per sq.mm. Attempts to eliminate sulphur and increase manganese content to 0.8% were made in order to maintain satisfactory resilience.

3-297. Influence des Additions d'Aluminium et de la Composition Chimique sur la Résilience de l'Acier Mi-Doux Electrique aux Etats Moulé or Forgé. (Influence of Aluminum Additions and of Chemical Composition on the Resilience of Cast or Forged Semi-Mild Electric Steel.) Paul Bastien and Claudius Dubois. *Revue de Métallurgie,* v. 43, Nov-Dec. 1946, p. 297-306.

Aluminum additions to rough cast steels are detrimental to its resilience. However, additions to forged annealed steel increase resilience. By keeping aluminum additions to a minimum, values for acid steels may approach those for basic steels.

3-298. Quelques Résultats Relatifs a la Résistance a la Fatigue sur les Métaux Légers. (Some Data Concerning the Resistance to Fatigue of Light Metals.) R. Chevigny. *Revue de Métallurgie,* v. 43, Nov-Dec. 1946, p. 330-335.

Data indicating the action of various factors on the fatigue limits of industrial aluminum alloys.

3-299. Effetto dell'Incrudimento Dopo Bonifica Sulle Proprieta delle Leghe Al-Mg-Si da Lavorazione Plastica. (Effect of Roughness After Treatment on the Workability of Al-Mg-Si Alloys.) C. Panseri and M. Monticelli. *Alluminio,* v 16, May-June 1947, p. 193-198.

Using an alloy containing 0.9 to 1.1% Si, 0.7 to 0.8% Mg, 0.6 to 0.8% Mn, traces of Cu and Fe, and the rest aluminum as an example, the effect of roughness on the mechanical characteristics of test specimens is discussed. A notable increase in corrosion resistance is observed after working.

3-300. Contribution a l'Etude des Fontes Spéciales a Haute Résistance Mécanique. (Contribution to the Study of Special Cast Irons, Having High Mechanical Resistance.) Georges Delbart and Rubin Potaszkin. *Fonderie*, June 18, 1947, p. 673-683.

Twelve heats of slightly varied composition were tested to determine the effect of carbon and silicon content on the mechanical properties and porosity of highly resistant cast irons. Inoculation with calcium silicide was found to be very satisfactory. 11 ref.

3-301. Superalloys. Part II. Walter G. Hildorf. *Western Machinery and Steel World*, v. 38, Sept. 1947, p. 126-129.

Concludes summary of the properties of 16-25-6 alloy (16% Cr, 25% Ni, 6% Mo) as affected by various treatments. Some of the properties are charted and tabulated in comparison with other high-temperature alloys.

3-302. Prispevek k Otazce Napousteci Krehkosti Oceli. (Contribution to the Problem of Temper Brittleness in Steel.) Fr. Poboril and V. Koselev. *Hutnické Listy*, v. 1, Nov. 1946, p. 97-101; Dec. 1946, p. 130-133; Jan. 1947, p. 155-158.

Results of experiments show that in steel having "permanent" temper brittleness, impact resistance as well as toughness increase at the same tensile strength with increasing temperature. It was also shown that there is a linear relationship between toughness and impact resistance at low temperatures (—78° C.).

3-303. Beryliove Bronzy a Jejich Vyroba. (Beryllium Bronzes and Their Production.) Jaroslav Malkovsky. *Hutnické Listy*, v. 1, Jan. 1947, p. 145-147; Feb. 1947, p. 173-176; March 1947, p. 203-206; April 1947, p. 228-229.

Properties, structure, and methods of production. 25 ref.

3-304. Density and Its Thermal Coefficient for Liquid Selenium. K. V. Astakhov, N. A. Penin and E. I. Dobkina. *Journal of General Chemistry (U.S.S.R.)*, v. 17 (79), no. 2, 1947, p. 378-381. (In Russian.)

Experimental method for measuring the density of molten selenium and results obtained in the range 218 to 405°. An equation for the thermal coefficient of density is derived from the data.

3-305. An Investigation of the Stress-Strain Diagram at Low Temperatures. E. M. Shevandin. *Factory Laboratory (U.S.S.R.)*, v. 13, July 1947, p. 858-870. (In Russian.)

Experimentally determined stress-strain diagrams are presented and discussed for three carbon steels (0.12 to 0.4%), a 5%-Ni steel, and copper, at various temperatures from 20 to —196°. Effects of different annealing temperatures.

3-306. Les Nouveaux Alliages Al-Mg-Zn A Hautes Caracteristiques Mecaniques: Zicral. (New Al-Mg-Zn Alloys Having Good Mechanical Characteristics: Zicral.) Part II. Pierre Vachet. *Revue de l'Aluminium*, v. 24, July-Aug. 1947, p. 225-233.

Methods of preparing and treating the Al-Mg-Zn alloys in use today. Comparison of the properties of Zicral and duralumin, Zicral being shown to have the better properties. Its Zn content is normally about 7.5%.

3-307. Behavior of Metal Cavity Liners in Shaped Explosive Charges. George B. Clark and Walter H. Bruckner. *Metals Technology*, v. 14, Aug. 1947, T.P. 2158, 12 p.

Previously published in *Mining Technology*, May 1947. (Annotated under item 3-168.) (Presented at New York Meeting of A.I.M.E., March 1947.)

3-308. A Statistical Theory of Fracture. J. C. Fisher and J. H. Hollomon. *Metals Technology*, v. 14, Aug. 1947, T.P. 2218, 16 p.

The possibility of developing a quantitative theory of fracture. A further effort is to rationalize by statistical analysis the size effect in solids, the scatter of fracture-stress values and dependence of fracture stress upon strain, and to make an approach to quantitative relations between structure and fracture stress. (Presented at Atlantic City Meeting of A.I.M.E., Nov. 1946.) 23 ref.

3-309. Influence of Plastic Deformation, Combined Stresses, and Low Temperatures on the Breaking Stress of Ferritic Steels. D. J. McAdam, Jr., G. W. Geil, and R. W. Mebs. *Metals Technology*, v. 14, Aug. 1947, T.P. 2220, 40 p.

Attention is confined to stress combinations that are produced by tension tests of notched or unnotched cylindrical specimens. Chief attention is given to experiments in which the specimen is first given a chosen amount of plastic deformation at room temperature and then tested to fracture at —188° C. By this means a study was made of the influence of plastic deformation and of the stress system on stress at cleavage fracture. 24 ref. (Presented at New York Meeting of A.I.M.E., March 1947.)

3-310. Anomalous Changes in Tensile Properties of Quenched Iron-Cobalt (35% Co) Alloys. James K. Stanley. *Metals Technology*, v. 14, Aug. 1947, T.P. 2221, 11 p.

Fourteen Fe-Co alloys, containing 35% Co, were quenched from various temperatures in water at 0° C. and their mechanical properties deter-

mined. Metallographic examination, lattice-constant determination, and aging treatment were used in order to obtain further information. (Presented at New York Meeting, A.I.M.E., March 1947.)

3-311. Cast Steels: Recent Developments Concerning Properties. Charles W. Briggs. *American Foundryman*, v. 12, Sept. 1947, p. 37-43.

Information obtained during the past 2 years, in the course of research for the Steel Founders' Society of America, at Carnegie Tech., Case, and Michigan College of Mines and Technology. Comparisons with wrought steels. (Presented before Semi-Annual Meeting of A.S.M.E., Chicago, June 16-19, 1947. To be continued.)

3-312. Austenitic Malleable Iron—a New Ferrous Material. C. K. Donoho. *Materials & Methods*, v. 26, Sept. 1947, p. 85.

Properties and applications of a modified Ni-Resist cast iron processed to provide a malleable rather than a gray iron structure. This results in a corrosion resistant material with good strength and ductility.

3-313. Properties and Applications of Molybdenum. J. Gelok. *Materials & Methods*, v. 26, Sept. 1947, p. 86-89.

Production of molybdenum by powder-metallurgy methods which permit application to a large number of miscellaneous uses for which it was not previously available because of size and other limitations.

3-314. Cast Iron and Steel. (Continued.) Ernest C. Pigott. *Iron and Steel*, v. 20, Sept. 1947, p. 442-444; Oct. 1947, p. 476-478.

Effects and applications of cast iron and steel alloyed with phosphorus, selenium, silicon, sulphur, tantalum, tellurium, tin, titanium, and tungsten.

3-315. The Theory of the Magneto-Resistance Effects in Metals. E. H Sondheimer and A. H. Wilson. *Proceedings of the Royal Society (Series A)*, v 190, Sept. 9, 1947, p. 435-455.

General formulas for the effect of a magnetic field on the electrical and thermal conductivities of a metal in which there are two overlapping bands of normal form. Simple formulas are set up which reduce to correct expressions in the cases of high and low temperatures and very strong magnetic fields. 17 ref.

3-316. High-Strength Cast Irons for Gears. E. M. Currie. *Machinery (London)*, v. 71, Sept. 11 1947, p. 291-295.

The selection of gear material. Information concerning the properties and structure of the various types, with emphasis on the superiority of the meehanites.

3-317. High-Temperature Metals. L. N. Rowley and B. G. A. Skrotzki. *Power*, v. 91, Oct. 1947, p. 79-94.

Recent developments, beginning with a review of fundamental principles. Structure, properties, testing, temperature effects, and design. Typical compositions and properties.

3-318. Abrasion Resistance of White Cast Iron Improved by Suitable Alloying. *Steel*, v. 121, Oct. 6, 1947, p. 184, 186.

Reviews talk by Kenneth A. DeLonge of International Nickel, before Salt Lake City Meeting of A.S.M.E.

3-319. Zur Theorie der Metalle. (On the Theory of Metals.) P. Gombás. *Müegyetemi Kozlemények*, no. 1, 1947, p. 25-29.

Solids are divided into 5 groups, one of which is metals; a statistical model is developed and electron potentials calculated for the valence electrons of metals.

3-320. Influence de la Teneur en Manganèse sur le Recuit de la Malléable a Coeur Noir. (Influence of Manganese Content on the Annealing of Black-Heart Malleable Iron.) Gabriel Joly. *Fonderie*, July 1947, p. 734-735.

Contents up to 0.35 to 0.40% were satisfactory where the sulphur content was 0.07 to 0.09%. Suggests maintaining the more usual figures (0.20 to 0.25%) for assured results.

3-321. Théorie de l'Anisotropie de Certains Aciers a Aimants Traités a Chaud dans un Champ Magnétique. (Theory of Anisotropy of Certain Magnetic Steels Heat Treated in a Magnetic Field.) Louis Neel. *Comptes Rendus*, v. 225, July 16, 1947, p. 109-111.

The magnetic anisotropy of alloys containing iron, nickel, and aluminum and a method for determining the order of magnitude of the anisotropic energy.

3-322. Variation de Champ Coercitif en Fonction de la Densité de Poudres Ferromagnétiques Agglomérées. (Variation in the Coercive Field as a Function of the Density of Agglomerated Ferromagnetic Powders.) Louis Weil. *Comptes Rendus*, v. 225, July 28, 1947, p. 229-230.

The law that agglomerated ferromagnetic powders have a decreasing coercive field, the greater the density of agglomeration, is verified by the author using iron and ferrocobalt powders.

3-323. Samband Mellan Stals Analys Och Härdbarhet Enligt Myare Amerikanska Arbeten. (Relationship Between Steel Analyses and Hardenability According to Recent American Work.) *Jernkontorets Annaler*, v. 131, no. 8, 1947, p 271-288.

Work on hardenability, most of which has been published in the

American literature, with emphasis on methods of quantitative determination and calculations. 27 ref.

3-324. Stollingsverschijnselen Bij Metalen. (Solidification Phenomena in Metals.) W. F. Brandsma. *Metalen*, v. 1, Aug. 1947, p. 231-234.

The solidification process of a binary alloy with an eutectic composition and of a binary alloy with a continuous series of compound crystals.

3-325. Influence of Structure and Composition on the Elastic Properties of Metallic Alloys. L. Guillet. *Engineers' Digest (American Edition)*, v. 4, Sept. 1947, p. 429-432.

Two pieces of test equipment for measuring elastic properties of metals: LeRolland-Sorin's apparatus for measurement of elastic moduli and Chevenard's micro-pendulum for torsion tests. Relative influence of metallographic factors no the elastic constants of metals. Elastic modulus is only slightly affected by composition or structure, but damping capacity (internal friction) is very sensitive to these changes. Therefore alloying, heat treatment, or cold work can be used to avoid dangerous resonance vibration stresses. (Translated and condensed from *Le Genie Civil*, v. 124, Feb. 1, 1947, p. 45-50.)

3-326. Preferred Orientations in Drawn and Annealed 70-30 Alpha Brass Tubes. Walter R. Hibbard, Jr. *Metals Technology*, v. 14, Sept. 1947, T.P. 2245, 4 p.

Preferred orientations in drawn 70-30 alpha-brass tubing were rationalized on the basis of a double texture with the [111] pole and the [100] pole parallel to the drawing direction and a random orientation about these directions as an axis. This texture is similar to that found in drawn alpha-brass wire. Hard drawn tubes with well developed textures did not crack when subjected to the standard mercurous nitrate test in spite of heavy reductions in diameter. The role of preferred orientations in reducing the tendency of metals toward intergranular cracking of the mercury type. 12 ref.

3-327. The Apparent Yield Strength of Plain Carbon Steel. J. A. Pope. *Engineering*, v. 164, Sept. 19, 1947, p. 284-288.

The present state of knowledge of yield strength of plain carbon steel is analyzed and suggestions are made concerning size and stress-distribution effects, in order to bring the various test results into agreement. (Condensed from paper read before Sec. G of the British Association, Dundee, Sept. 2, 1947.)

3-328. Upper Yield Point: Occurrence in Bending Tests and Signification. Carl Benedicks and Roman Skorski. *Nature*, v. 160, Sept. 20, 1947, p. 399.

Experiments on soft iron wire and carbon steel show drop in stress after the yield point, or beginning of permanent elongation. This upper yield point is present when there is a hard skeleton in the grain boundaries.

3-329. Supersonic Wave Penetration Into Materials. Benson Carlin. *Product Engineering*, v. 18, Oct. 1947, p. 169.

Table of experimental values of approximate maximum depth of penetration in specific samples.

3-330. Mechanical Properties of Aluminum-Magnesium Alloys at the Temperature of Liquid Oxygen. A. B. Fradkov. *Kislorod (Oxygen)*, 4th yr., Jan-Feb. 1947, p. 54-55. (In Russian.)

Results of tests on 5 and 7% Mg aluminum-alloy sheet at 20 and −183° C. (From paper by H. Mader, *Zeitschrift fur die ges. Kalte-Industrie*, June 1942.)

3-331. Introduction to the Fatigue of Metals. H. H. Egginton. *Journal of the Birmingham Metallurgical Society*, v. 27, March 1947, p. 258-278.

A short history of fatigue investigation and some of the factors of prime importance to the phenomenon. A few features of metals under cyclic stress.

3-332. Investigation of Failures of Aircraft Components. C. W. George. *Journal of the Birmingham Metallurgical Society*, v. 27, June 1947, p. 308-338.

The various types of failures observed in nonferrous metals and alloys during 30 years experience in the investigation of such failures. Possible causes of failure in various alloy components.

3-333. Nonhomogeneity of Ferromagnetic Substances as the Cause of Excessive Energy Losses During Reversal of Magnetization. V. V. Druzlinin and R. I. Janus. *Journal of Technical Physics (U.S.S.R.)*, v. 17, June 1947, p. 641-650. (In Russian.)

During magnetic reversals in a pile of ferromagnetic sheets, under the influence of induced current, energy losses are caused by hysteresis, eddy currents, and a third factor previously known as "magnetic aftereffects". The latter are now ascribed to inhomogeneities in the ferromagnetic materials on the basis of the experimental results.

3-334. The Reaction Between Carbon and Oxygen in Liquid Iron. J. D. Fast. *Philips Research Reports*, v. 2, June 1947, p. 205-227.

Chemical constants of the above reaction are derived from a consideration of the equilibrium between a

liquid-iron phase in which small quantities of oxygen and carbon are dissolved, and a gas phase consisting of a mixture of CO and CO_2. 23 ref.

3-335. The Temperature-Magnetic Hysteresis of Ferromagnetic Substances. Ia. S. Shur and V. I. Drozlizhina. *Journal of Experimental and Theoretical Physics (U.S.S.R.),* v. 17, July 1947, p. 607-613. (In Russian.)

Magnetization of Ni and Fe-Si specimens under a constant magnetic field and cyclic variations in temperature.

3-336. Creep Rate of Various Industrial Leads. J. Neill Greenwood and J. H. Cole. *Metallurgia,* v. 36, Sept. 1947, p. 233-235.

Results of creep-rate determinations on industrial leads from various sources compared with results for some synthetic laboratory products. It is shown that total impurity content is no guide to creep behavior. Suggests 100-day test under 500 psi., followed by embrittlement determination and metallographic examination for evaluation of commercial lead alloys.

3-337. Fatigue of Ferrous Materials; Some Factors That Influence Resistance to the Damaging Effect of Fatigue Stressing. *Metallurgia,* v. 36, Sept. 1947, p. 249-251.

Discusses several papers presented at recent meeting of the A.S.T.M. concerning damaging effect of fatigue, means of improving the fatigue resistance of low-alloy steel axle shafts, fatigue tests on steel under compressive stress, and the fatigue testing of ball and roller bearings.

3-338. The Fluidity of Steel. R. Jackson, D. Knowles, T. H. Middleham, and R. J. Sarjant. *Journal of the Iron and Steel Institute,* v. 157, Sept. 1947, p. 1-21.

Results of experiments on the fluidity-temperature relationships, as indicated by Ruff and Spiral mold tests, of four steels—2% Cu steel, Si-Ni steel, low-carbon steel, and 13% Mn steel, melted in high-frequency furnaces with acid and basic linings. The Spiral mold gave more consistent results than the Ruff. Comparison of the results with those of Taylor, Rominski, and Briggs on similar steels showed widely differing fluidity-temperature relationships with similar molds. Investigation of the pyrometric methods used indicates that the differences were mainly caused by time lag in the American temperature measurements.

3-339. Deformation of Metals During Single and Repeated Tensile Impact. J. A. Pope. *Journal of the Iron and Steel Institute,* v. 157, Sept. 1947, p. 31-54.

The falling-tup type of machine was used and an adjustable stop was fitted to the machine so that either a single impact could be split up into a number of stages or repeated impact tests could be carried out with constant velocity of deformation. The mode and spread of deformation were examined by microscope, by Vickers hardness tests, and by measuring the change in diameter of the specimen at various points. The metals tested were Lowmoor iron and mild steel. A general theory expressed in dimensionless groups is developed to explain the mode of deformation. This gives good agreement with experimental results. It was found that the spread of deformation during impact is fundamentally different from that for static deformation. 12 ref.

3-340. Discussion on Papers, Spring Meeting, 1947. Discussion on a Symposium on the Hardenability of Steel. *Journal of the Iron and Steel Institute,* v. 157, Sept. 1947, p. 55-80.

Discussion at meetings and written contributions relative to the papers included in the above symposium (Special Report No. 36). Authors' replies will be published later.

3-341. The Reflectivity of Speculum Metal. S. Tolansky. *Journal of Scientific Instruments,* v. 24, Sept. 1947, p 248-249.

Reflectivities of electrodeposited speculum and of speculum prepared by vacuum evaporation were determined over the range 4500-6500Å. The higher reflectivity of evaporated speculum as compared with electrodeposited speculum of the same composition is attributed to the greater perfection of the evaporated mirror surface and consequent reduction in the amount of nonspecular reflection.

3-342. Stability of Steel at Elevated Temperatures. A. B. Wilder and J. D. Tyson. *Steel,* v. 121, Oct. 20, 1947, p. 86-89, 108, 111.

Scope of extensive research program being conducted on high-temperature piping materials at National Tube Co., Lorain, Ohio.

3-343. Beryllium and Beryllium Bronze (Beryllium Copper). (Continued.) Robert Gadeau. *Microtecnic,* v. 1, Aug. 1947, p. 85-89. (English section.) (For figures see French section, p. 195-204.)

Composition and general properties; effects of various thermal treatments. (To be continued.)

3-344. Metallurgical Properties of High Yield Strength Seamless Line Pipe. A. B. Wilder and J. D. Tyson. *Welding Journal,* v. 26, Oct. 1947, p. 872-880.

Results of a study of a new grade of seamless line pipe with 52,000 psi.

minimum yield strength and 75,000 psi. minimum tensile strength. The steel of this pipe contains 0.40% max. carbon and 1.40% max. Mg as compared with 0.30% and 1.25%, respectively, in the steel commonly used for line pipe. Various factors relating to bend tests, various welding-rod combinations, and the influence of chemical composition of the steel on the weld properties, were investigated. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

3-345. **High-Frequency Excitation of Iron Cores.** J. D. Cobine, J. R. Curry, Charles J. Gallagher, and Stanley Ruthberg. *Proceedings of the I.R.E.*, v. 35, Oct. 1947, p. 1060-1067.

Several iron alloys intended for use in wide-band transformers were studied from the point of view of core loss and exciting impedance. Techniques for studying these properties using both high-frequency sine-wave and wide-band random-noise excitation. The frequency range of 0.1 to 5 megacycles was covered. Materials investigated include Hipersil, Monimax, molybdenum permalloy, and B9W4A.

3-346. **Tantalum as an Engineering Material.** Kenneth Rose. *Materials & Methods,* v. 26, Oct. 1947, p. 94-98.

Properties and application.

3-347. **Lead Alloys for Industry.** *Materials & Methods,* v. 26, Oct. 1947, p. 127.

Data concerning eight lead-base bearing alloys, nine lead-base solders, six Pb-Sb alloys; six type metals; and tellurium lead.

3-348. **Service Life of Austenitic Alloy Furnace Tubes.** Charles S. Pugsley, Jr. *Petroleum Refiner,* v. 26, Oct. 1947, p. 119-120.

Data on 18-8 chromium-nickel steel tubes in 1000-lb. thermal-cracking units for 16 years. As a result of experience, each tube is now removed for sandblasting, inspection, and reconditioning, and is replaced after 60,000 service hours. Careful and frequent inspections and strict adherence to a maximum tube-metal temperature of 1200° F. have practically eliminated tube failures in service. (Presented at Conference on Petroleum Mechanical Engineering, A.S.M.E., Houston, Tex., Oct. 1947.)

3-349. **The Physics of Sheet Steel. (Continued.)** G. C. Richer. *Sheet Metal Industries,* v. 24, Oct. 1947, p. 1990-1992.

Under "initial magnetization" are discussed the lattice mechanism of "nibbling growth" and elementary theory. (To be continued.)

3-350. **Wrought Aluminum Alloys—Their Properties, Heat Treatment, and General Characteristics.** H. S. Spaulding. *Wire and Wire Products,* v. 22, Oct. 1947, p. 772-773, 776-778.

Presented at Wire Association Convention, Chicago, Oct. 1947.

3-351. **Cast Steels; Recent Developments Concerning Properties. (Concluded.)** Charles W. Briggs. *American Foundryman,* v. 12, Oct. 1947, p. 44-50.

Results of static and notched-bar impact tests on carbon and alloy cast steels. Effects of heat treatment variations and impact resistance of cast vs. wrought steels. (Presented at Semi-Annual Meeting of A.S.M.E., Chicago, June 16-19, 1947.)

3-352. **Developments in Magnetic Steels for Transformers.** C. C. Horstman and C. H. Bartlett. *Steel Processing,* v. 33, Oct. 1947, p. 603-605, 644.

Comparative properties of old and new magnetic alloys.

3-353. **Machinability of a Standard Machine Steel.** John Erb and E. J. Weller. *Steel Processing,* v. 33, Oct. 1947, p. 622-623.

Table and photomicrographs show machinability and structure, respectively, of steel containing 0.18% C, 0.40% Mn, 0.40% P, 0.050% S, and 0.25% Si, as received, and after five different representative commercial heat treating procedures.

3-354. **The Vital Component—Good Castings.** C. E. Herington. *Western Machinery and Steel World,* v. 38, Oct. 1947, p. 80-85.

Mechanical properties, applications, and advantages of Meehanite cast irons. Effects of different heat treatments

3-355. **The Metallurgical Aspects of Gas Turbine Wheels and Nozzles.** E. M. Phillips. *Society of Automotive Engineers Preprint,* Oct. 1947, 12 p.

History of the development of satisfactory alloys. Tables and charts show comparative properties and photomicrographs show satisfactory structures.

3-356. **The Total Emissivity of Various Materials at 100 to 500° C.** B. T. Barnes, W. E. Forsythe, and E. Q. Adams. *Journal of the Optical Society of America,* v. 37, Oct. 1947, p. 804-807.

Total emissivities were measured for various metal, carbon, paint-coated, and glass samples. Equipment and techniques.

3-357. **Thermal Hardening of Cadmium Crystals.** C. L. Smith. *Nature,* v. 160, Oct. 4, 1947, p. 466-467.

The phenomenon of thermal hardening was first observed by Orowan, in single crystals of chemically pure zinc. Sometimes zinc crystals, after 24 to 48 hr. at room temperature, showed no plastic deformation with

applied stresses as much as 30% above previously determined critical yield stresses. The crystal might remain for several minutes without yielding. Extension would suddenly occur, and the yield stress would fall to the value originally observed. Outlines work which shows that the phenomenon occurs invariably in single crystals of spectroscopically pure cadmium. Effects of time of annealing, crystal orientation, and prestraining.

3-358. Nickel-Bearing Copper. *Metal Industry,* v. 71, Oct. 10, 1947, p. 301.

Physical and mechanical properties of new high-conductivity temper-hardened alloy.

3-359. Requirements for Die-Casting Alloys. A. W. Sundwick. *American Machinist,* v. 91, Oct. 23, 1947, p. 143.

General information on zinc-base die-casting alloys, and effects of aluminum, copper, magnesium, iron, lead, cadmium, and tin.

3-360. Freezing Points of Cobalt and Nickel and a New Determination of Planck's Constant C_2. M. S. Van Dusen and A. I. Dahl. *Science,* v. 106, Oct. 31, 1947, p. 428-429.

Equipment and results obtained at National Bureau of Standards.

3-361. Observations on the Failure of 80 Nickel, 20 Chromium Alloy at Excessive Temperatures. H. D. Holler. *Electrochemical Society Preprint 92-7,* 1947, 7 p.

Decrease in cold electrical resistance of a wire heating element of the above alloy was accompanied by a loss of chromium. There was little change in the resistance measured hot. Suggests measurement of the cold resistance of a heating element to indicate whether wire temperatures are excessive.

3-362. Repeated-Load Tests on Metals in the Plastic Zone. I. M. Poitman and Ia. B. Fridman. *Factory Laboratory (U.S.S.R.),* v. 13, April 1947, p. 452-463. (In Russian.)

Apparatus and results of experiments on Armco iron, copper, high-strength steels, and aluminum alloys.

3-363. Correlation Between Impact Resistance and Cross-Sectional Reduction. Sh. S. Manevich. *Factory Laboratory (U.S.S.R.),* v. 13, April 1947, p. 479-481; discussion, p. 481. (In Russian.)

As a result of a statistical treatment of data for 3000 specimens of high-alloy structural steel, a mathematical and graphical relationship is developed. Such relationship holds only for high-strength steels.

3-364. Some Facts About the Influence of the State of the Surface on the Cold Brittleness of Steel. E. M. Shevandin. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 596-600. (In Russian.)

Experiments on two steels (0.20% C and 0.25% P; 0.1% C). The theory proposed for the mechanism of transition to the brittle state satisfactorily explains the experimental facts.

3-365. Characteristics of Silver and Copper for Use as Electrical Contacts. B. W. Jones and L. L. Zickrick. *Product Engineering,* v. 18, Nov. 1947, p. 104-107.

Significant electrical and metallurgical properties. Effects of sulphide and oxide films, current-resistance relationships, welding characteristics, arcing properties, effect of heavy current on surface structure, and solder on contact tip.

3-366. The Annealability of White Iron in the Manufacture of Malleable Iron. S. W. Palmer. *Foundry Trade Journal,* v. 83, Oct. 2, 1947, p. 87-94; Oct. 9, 1947, p. 107-113; Oct. 16, 1947, p. 129-135; discussion, p. 135-138.

Chemical compositions and mechanical properties of a large number of test bars are tabulated and photomicrographs illustrate structures of samples containing different percentages of manganese and sulphur. Development of an annealability test. (Presented at Nottingham Conference of Institute of British Foundrymen.)

3-367. The Variation of the Reflectivity of Nickel With Temperature. Robert Weil. *Proceedings of the Physical Society,* v. 59, Sept. 1, 1947, p. 781-791.

A new method for measurement of the reflectivity of metals in the visible part of the spectrum. The multiple-reflection arrangement is applied to an investigation of the reflectivity of nickel at different temperatures. A novel way of polishing mirrors; construction of a vacuum furnace; experimental technique. 15 ref.

3-368. Rhodium. L. B. Hunt. *Metal Industry,* v. 71, Oct. 24, 1947, p. 339-342.

Engineering properties and uses.

3-369. Adsorption of Gases on Surfaces of Powders and Metal Foils. R. T. Davis, Jr., T. W. DeWitt, and P. H. Emmett. *Journal of Physical & Colloid Chemistry,* v. 51, Nov. 1947, p. 1232-1248.

The adsorptions of nitrogen, krypton, n-butane, 1-butene, and Freon-21 were measured on silver foil, monel ribbon, and a variety of powdered materials. Areas of the materials were calculated from the data by use of the B.E.T. equation. It was found necessary to apply suitable corrections to the surface-area values calculated using the various gases.

3-370. Les Propriétés Dynamiques, les Capacités d'Endurance et la Qualification des Aciers Pour Pièces de Fatigue des Moteurs. (Dynamic Properties, Fatigue Strength, and Qualification of Steels for

Moving Engine Parts.) **Part I.** Alexandre Fotiadi. *Revue de Métallurgie,* v. 44, Jan-Feb. 1947, p. 12-39.

Results of extensive tests on aircraft-engine parts to determine causes of fatigue and methods for eliminating it. Dynamic properties of steels. Tensile and bend tests. Conditions of actual use are simulated.

3-371. Influence de Très Petites Quantités de Soufre et d'Inclusions Oxydées sur la Qualité des Aciers. (Influence of Very Small Quantites of Sulphur and Oxide Inclusions on the Quality of Steels.) L. Colombier. *Revue de Métallurgie,* v. 44, Jan-Feb. 1947, p. 47-57.

Results of experiments indicate that improvement of steel quality may be obtained by desulphurization, even when the sulphur content is only 0.005% or less. However, the effect depends more on the number and size of the sulphide inclusions than on the percentage composition. The nature of oxide inclusions also has an effect upon the classification of steels according to different properties. Many unexplained variations in steel quality may be caused by minute quantities of various elements present.

3-372. Ueber das Kriechverhalten Einiger Aluminium- und Magnesiumlegierungen Bei Temperaturen Zwischen 90 und 180°. (Creep Behavior of Some Aluminum and Magnesium Alloys in the Temperature Range From 90 to 180°.) Franz Bollenrath and Hanns Grober. *Metallforschung,* v. 2, April 1947, p. 104-111.

Al-Cu-Mg alloys having high plasticity, also other Al-Mn alloys, were creep tested for 300 hours. Resulting data.

3-373. Ueber den Zusammenhang der Härte Einer Bearbeiteten Metalloberfläche mit der Durch Die Bearbeitung Entstandenen Strukturänderung. (The Relationship Between the Hardness of a Machined Metal Surface and the Structural Changes Caused by Machining.) Karl Heinz Leise. *Metallforschung,* v. 2, April 1947, p. 111-114.

Relationships were established for different depths of machined monocrystalline surfaces. Hardening due to cold working.

3-374. Selbstentzuendliche Legierungen. (Pyrophoric Alloys.) Ernest Raub and Max Engel. *Metallforschung,* v. 2, April 1947, p. 115-119.

The self-ignition of Ag-Th alloys is caused by spontaneous oxidation of the thorium, preceded by the decomposition of water. Effects of sintering on this phenomenon and the effect of additions of other metals.

3-375. Freezing Points of Cobalt and Nickel. Milton S. VanDusen and Andrew I. Dahl. *Journal of Research of the National Bureau of Standards,* v. 39, Sept. 1947, p. 291-295.

Values determined for the freezing points and a value for Planck's constant C_2 calculated on the basis of observed ratios of brightness of black bodies at the freezing points of nickel and gold, cobalt and gold, and palladium and gold, and values of the freezing temperatures of these metals on the thermodynamic scale. More detail than article in Oct. 31, 1947, issue of *Science.* 13 ref.

3-376. Creep and Fatigue as Affected by Grain Boundaries. Charles Crussard. *Metal Treatment,* v. 14, Autumn 1947, p. 149-160.

Work on the role of grain boundaries in creep and fatigue with particular reference to the hexagonal metals, zinc and magnesium. 18 ref. (Presented at meeting of La Société Francaise de Métallurgie.)

3-377. Brittle Fracture in Mild-Steel Plates. W. Barr and Constance F. Tipper. *Journal of the Iron and Steel Institute,* v. 157, Oct. 1947, p. 223-238.

The temperature range of transition from tough to brittle fracture of mild-steel plates of different C and Mn contents was determined by means of notched-bar impact, notched-bend, and notched tensile tests. Results obtained were in good agreement, except that for very soft steels the notched tensile test gave a lower transition range than the other two tests. It was found that the range is raised by an increase in the ferritic grain size, by an increase in plate thickness, and by slow cooling after normalizing. It was also found that a high notched-bar impact value may be accompanied by a fracture which is mainly cleavage. Results also indicate that effects of plate thickness and slow rates of cooling in raising the transition range are reduced in mild-steel plates with higher Mn contents.

3-378. Effect of the Manganese Carbon Ratio on the Brittle Fracture of Mild Steel. W. Barr and A. J. K. Honeyman. *Journal of the Iron and Steel Institute,* v. 157, Oct. 1947, p. 239-242.

A series of four mild steels was tested in which the only significant variable was the Mn-C ratio. Notched-bar impact properties in the annealed and in the normalized conditions were determined. It was found that increasing the ratio lowers the range of transition from tough to brittle fracture, increases the impact values at all temperatures, and tends to result in finer McQuaid-Ehn and ferritic grain sizes. Recommends a ratio of not less than 3.0 for structural shipbuilding steels.

3-379. The Physics of Sheet Steel. (Continued.) G. C. Richer. *Sheet Metal Industries,* v. 24, Nov. 1947, p. 2194-2198, 2206.

Discussion of magnetization under the following headings: deficiencies in elementary theory; magneto-elastic modulus; susceptibility constant; idealized relationships; fundamental aspects; theory vs. practice; and the problem of measurement. (To be continued.)

3-380. Effect of Sulphur in Cast Steel. G. A. Lillieqvist. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 219-230; discussion, p. 230-233.

Results of experiments on aluminum-killed steels. When the aluminum addition is sufficiently large, a double sulphide of aluminum and iron appears in the form of inclusions which result in maximum ductility. Effects of sulphur and aluminum on yield and tensile strengths, ductility, and impact strength, and on hot-tear formation; spiral fluidity tests on sulphur-containing melts. 11 ref.

3-381. The Change in Mechanical Properties of Mild Steel Under Repeated Impact. F. V. Warnock and J. A. Pope. *Institution of Mechanical Engineers Proceedings,* v. 157, War Emergency Issue No. 26, 1947, p. 33-44; discussion, p. 45-51.

Results of experiments in which a falling-tup type of tensile impact machine was used. A scratch extensometer was fitted to the specimen, and the stresses induced were investigated. Mean stress per blow is calculated for various velocities of impact and energy per blow. Observed phenomena and their practical significance.

3-382. Erosive Effects of Gun Blast on Materials—Development of a Strong Brittle Alloy. James A. Broadston. *ASTM Bulletin,* Oct. 1947, p. 39-46.

Adoption of jet propulsion for piloted aircraft has made it necessary to reduce drag to a minimum. Gunport doors arranged to open and close before and after each firing are necessary. Many metallic and nonmetallic materials were evaluated for these doors, and a strong and brittle Cu-Mg-Zn aluminum alloy was developed. Results of mechanical testing and metallographic inspection of this alloy; the gun-blast deposit and of its corrosive effect upon the alloy. (Presented at Annual Meeting, A.S.T.M., Atlantic City, N. J.)

3-383. Pearlitic Malleable Cast Iron. *Engineering Materials and Processes,* v. 5, Oct. 1947, p. 138-141.

Properties and applications.

3-384. Creep and Some Creep Resisting Alloys. G. Burns. *Engineering Materials and Processes,* v. 5, Oct. 1947, p. 123-126.

3-385. Strain-Age Embrittlement of Steel. *Engineer,* v. 184, Oct. 31, 1947, p. 412-413.

Reviews critically six recent papers on this subject.

3-386. Cast Iron and Steel; Influence and Commercial Applications of Constituent Elements. (Concluded.) Ernest C. Pigott. *Iron and Steel,* v. 20, Nov. 1947, p. 519-520.

Tungsten, uranium, vanadium, zinc, and zirconium.

3-387. Mechanism of Fracture of Glass and Similar Brittle Solids. Nelson W. Taylor. *Journal of Applied Physics,* v. 18, Nov. 1947, p. 943-955.

A theory is proposed which connects stress required to break a brittle material in simple tension with duration of application. Applicability to fatigue of metals under stress-corrosion conditions. An equation is proposed which connects Young's modulus and the critical fracture distance with the surface tension of the solid. 28 ref. (Presented at Annual Meeting, Society of Rheology, New York, Nov. 2, 1946.)

3-388. Mechanical Behavior of High Damping Metals. Clarence Zener. *Journal of Applied Physics,* v. 18, Nov. 1947, p. 1022-1025.

The relation between the two measures of internal friction most commonly used, logarithmic decrement and tangent of the angle with which strain lags behind stress, is deduced for all levels of internal friction in the important case in which the dissipation of energy is due to a relaxation process having a single time of relaxation. The conditions are further derived under which a specimen of such a metal will not vibrate, but returns periodically to its equilibrium configuration.

3-389. The Strange Behavior of Metals at Very Low Temperatures. Donald H. Andrews. *Refrigerating Engineering,* v. 54, Nov. 1947, p. 431-435, 482-483.

Fundamental principles of work in the region just above absolute zero, including the phenomena of superconductivity and superfluidity, and the use of bolometers at low temperatures. 17 ref.

3-390. Interpretation of High Coercivity in Ferromagnetic Materials. E. C. Stoner and E. P. Wohlfarth. *Nature,* v. 160, Nov. 8, 1947, p. 650-651.

A new theory to explain the above.

3-391. The Absorption of 17-Mev Gamma-Rays in Lead and Aluminum. Boyce D. McDaniel, Guy von Dardel, and Robert L. Walker. *Physical Review,* v. 72, Nov. 15, 1947, p. 985-986.

Use of gamma-ray spectrometer. Results from a theoretical standpoint.

3-392. Carbides, Nitrides and Porosity in Aluminum. Davidlee Von Ludwig. *Iron Age*, v. 160, Nov. 20, 1947, p. 73-78, 141.

Taking issue with the belief that hydrogen is the primary cause for porosity in aluminum alloys, the author points to carbides and nitrides as the major contaminants. Chemical reactions involving carbon and nitrogen, and the conditions under which they cause a reduction in physical properties. Investigation indicates lack of correlation between strength properties and conventional X-ray examination techniques. Lack of satisfactory analytical methods for isolation and identification of minute amounts of active, nonmetallic constituents.

3-393. Metallurgical Properties of High Yield Strength Seamless Line Pipe. A. B. Wilder and J. D. Tyson. *World Oil*, v. 127, Dec. 1947, p. 209-210.

Condensed from paper presented before American Welding Society, Chicago, Oct. 18-24, 1947. See item 3-344.

3-394. Beryllium in Magnesium Casting Alloys. Jay R. Burns. *Technical Data Digest*, v. 12, Dec. 1, 1947, p. 5-12.

See item 3-245.

3-395. The Absorption of Gamma-Rays From Co^{60}. M. V. Mayneford and A. J. Cipriani. *Canadian Journal of Research*, v. 25, Nov. 1947, Sec. A, p. 303-314.

Measurements on beryllium, carbon, H_2O, D_2O, aluminum, steel, copper, silver, platinum, mercury, lead, bismuth, and uranium; their theoretical interpretation.

3-396. Thermal Conductivity of Metals at High Temperatures. Part I. Description of the Apparatus and Measurements on Iron. L. D. Armstrong and T. M. Dauphinee. *Canadian Journal of Research*, v. 25, Nov. 1947, Sec. A, p. 357-374.

Apparatus for the temperature range 0 to 800° C. The method utilizes unidirectional heat flow in a cylindrical sample in a vacuum. Advantages of the method. Measurements on Armco iron indicate that results with an absolute error of less than 2% may be obtained.

3-397. Molybdenum in Ferrous Base Metals. G. Fitzgerald-Lee. *British Steelmaker*, v. 13, Nov. 1947, p. 564-568.

Influence on steel alloys; its use in cast iron; foundry technique for producing uniformity of structure of molybdenum cast iron; special purpose steels containing molybdenum.

3-398. Bibliography on the Fatigue Properties of Cast Iron. G. R. Woodward. *Bulletin of the British Cast Iron Research Association*, v. 9, Nov. 1947, p. 59-63.

54 references.

3-399. Application Tables to Guide in the Selection of Materials. Part II. Zola Fox. *Product Engineering*, v. 18, Dec. 1947, p. 165, 167.

The wrought magnesium alloys and the various casting alloys.

3-400. On the Pressure-Volume and Pressure-Compressibility Relation of Metals. P. Gombas. *Physical Review*, v. 72, Dec. 1, 1947, p. 1123-1124.

A statistical theory for the bonds in alkali and alkaline-earth metals. Results of calculation of pressure-volume relations for sodium, potassium, rubidium, cesium, barium, strontium, and magnesium at pressures up to 10^5 kg. per sq.cm. are charted and compared with Bridgman's experimental results. Agreement between experimental and theoretical curves is quite satisfactory.

3-401. An Evaluation of Boron-Treated Steels. Walter F. Toerge. *Steel*, v. 121, Dec. 8, 1947, p. 93-98, 100, 102, 104.

Investigations reported in the past two years furnish convincing proof that boron, when added to medium-carbon steel in very small amounts, exercises powerful influence on certain physical properties of the steel. How the element is introduced and what methods are available for accurately determining its presence.

3-402. Thermal Expansion of Some Copper Alloys. Peter Hidnert and Harrison S. Krider. *Journal of Research of the National Bureau of Standards*, v. 39, Nov. 1947, p. 419-424.

Results of investigation of some brasses, bronzes, and other copper alloys for various temperatures between room and 300 °C. 17 ref.

3-403. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 39, Dec. 1947, p. 91A-92A.

Corrosion resistance, mechanical properties, and some uses of a new heat hardenable 18-8 stainless steel known as Stainless W.

3-404. Carbides for High Temperature Applications. *Materials & Methods*, v. 26, Dec. 1947, p. 85-86.

A new carbide designed to resist temperatures which rapidly destroy conventional carbide compositions falls into a new category termed "ceramals" containing both metals and compounds.

3-405. The Physics of Sheet Steel. (Continued.) G. C. Richer. *Sheet Metal Industries*, v. 24, Dec. 1947, p. 2411-2416.

Fundamentals of ferromagnetism. (To be continued.)

3-406. Temperature Transitions in Ductility of Steel. Wendell P. Roop. *Welding Journal,* v. 26, Dec. 1947, p. 748s-752s.

"Temperature transition" refers to the shift in medium steel from ductile behavior at higher temperature to brittle behavior at lower temperature. The temperature limit, which separates two alternative modes of behavior is typically not a sharp boundary but a zone. Two features of the transition zone must be distinguished: position and width. Various zone shapes and their significance; application of the transition curves to specific data.

3-407. The Permanent Strain in a Uniform Bar Due to Longitudinal Impact. M. P. White and LeVan Griffis. *Journal of Applied Mechanics,* v. 14 (*Transactions A.S.M.E.,* v. 69), Dec. 1947, p. A337-A343.

A method for predicting the final strained state of a long uniform bar or wire of ductile material subjected to a longitudinal impact of finite duration during which the impact stress is constant and exceeds the yield strength. Various strain zones are delineated and a definite relation is given between the stress history at a point in the specimen and the velocity at that point. (Presented at Annual Meeting of A.S.M.E., Atlantic City, N. J., Dec. 1-5, 1947.)

3-408. Hardenability. P. R. Wray. *Iron Age,* v. 160, Dec. 11, 1947, p. 84-89.

The fundamental concepts of hardenability, and the relationship between these concepts and microstructural changes. The derivation and functions of hardenability bands and the means of applying hardenability band data to the solution of steel selection problems.

3-409. Reheating of 24S and 75S Aluminum Sheet. J. A. Nock, Jr. *Iron Age,* v. 160, Dec. 25, 1947, p. 73-79.

Changes in strength and elongation values and in resistance to corrosion, occurring at various temperature levels, when reheating the two alloys in the naturally aged and artificially aged conditions. Limitations and possibilities of application of these alloys at elevated temperatures.

3-410. Les Propriétés Dynamiques, les Capacités d' Endurance et la Qualification des Aciers pour Pièces de Fatigue des Moteurs. (Dynamic Properties, Fatigue Strength, and Qualification of Steels for Moving Engine Parts.) (Concluded.) Alexandre Fotiadi. *Revue de Metallurgie,* v. 44, March-April 1947, p. 97-121; discussion, p. 121.

The results of fatigue tests under a variety of conditions.

3-411. Polarization of Neutrons in Different Materials. J. R. Wallace, D. J. Hughes, and R. H. Holtzman. *U. S. Atomic Energy Commission MDDC-873,* April 22, 1947, 2 p.

Experimentally obtained variations of polarizations with material, magnetization, thickness, and neutron velocity, in various ferrous and nonferrous metals and alloys.

3-412. Relationship of Fatigue Limit and True Tensile Strength. M. P. Markovets. *Factory Laboratory (U.S.S.R.),* v. 13, Aug. 1947, p. 1003-1007. (In Russian.)

The closest relationship is shown by the formula: tensile strength equals yield point times the sum of 1.35 times the per cent reduction in area plus one. A formula for the strength of high-quality structural steel is proposed, based on the above. 12 ref.

3-413. Experiments on the Effect of Low Temperature on Some Plastic Properties of Metals. M. J. Druyvesteyn. *Applied Scientific Research (Sec. A),* v. 1, no. 1, 1947, p. 66-80.

Yield value, breaking strength, elongation, and hardness of a number of pure polycrystalline metals were measured at room temperature and at −183° C. The yield value is always higher at −183 than at 20° C., the difference being relatively small for the cubic face-centered and a number of hexagonal metals, but large for the body-centered metals and for Zn, Cd, and Sn.

3-414. Developing Maximum Strength in Alloy Steel Bolts. G. Sachs. *Fasteners,* v. 4, no. 3, 1947, p. 15-18.

Results of an investigation conducted to clarify some of the factors which cause embrittlement of high-strength alloy-steel bolts.

3-415. Creep Tests on Chromium Manganese Vanadium Steel Alloys. Paul Even. *Headquarters Air Materiel Command, Wright Field, Translation F-TS-1864-RE,* Sept. 1947, 3 p. (Translated from report of B.M.W. Flugmotorenbau G.m.b.H., March 1945.)

Temperatures of exhaust-gas turbine blades were reduced by cooling to approximately 500 to 620° C. Based on this reduction in temperature, tests on blades of Cr-Mn-V steel alloys were made. Creep tests for 100 hr. showed 1% total elongation.

3-416. Influence du Bore sur L'Aptitude à la Trempe des Aciers. (Effect of Boron on the Temperability of Steel.) Gabriel Joly. *Fonderie,* no. 21, Sept. 1947, p. 812.

Résumé of American work.

3-417. The Behavior of Ferromagnetic Substances Close to the Curie Point. V. L. Ginzburg. *Journal of Experimental*

and Theoretical Physics (U.S.S.R.), v. 17, Sept. 1947, p. 833-836. (In Russian.)
A theoretical, mathematical development based on the theory of phase transitions of the second type but differing from the method used by Weiss.

3-418. The 1350° F. Stress-Rupture Properties of Two Wrought Alloys and Three Cast Alloys. E. E. Reynolds, J. W. Freeman, and A. E. White. *National Advisory Committee for Aeronautics Technical Note No. 1380,* Nov. 1947, 23 p.
Rupture-test characteristics determined for two wrought alloys, NR-82 (6059 modified low carbon) and NR-84 (N-155 modified low carbon); and three precision-cast alloys, NR-71 (X-40), NR-87 (Co-Cr-Ni base, 9% Mo) and NR-90 (Co-Cr-Ni base, 5% Mo, 5% W). The two wrought alloys were tested in the solution treated and aged condition and the cast alloys were aged before testing.

3-419. Annealing Temperature and Hardness of Tantalum. J. Neill Greenwood and R. H. Myers. *Nature,* v. 160, Nov. 15, 1947, p. 675.
It was found that after a slight preliminary softening (temperatures up to 1100° C.) the hardness rose steeply, reaching a maximum value after heating to 1800° C., then falling again at higher temperatures.

3-420. The Theory of Combined Plastic and Elastic Deformation With Particular Reference to a Thick Tube Under Internal Pressure. R. Hill, E. H. Lee, and S. J. Tupper. *Proceedings of the Royal Society (Series A),* v. 191, Nov. 18, 1947, p. 278-303.
Theory of deformation of materials under combined stresses which involve both elastic and plastic components of strain. The relationship between stress and strain is represented on a plane diagram which facilitates discrimination between the components of strain and aids considerably the solution of certain problems. The theory is applied to the deformation of a long, thick tube under internal pressure with zero longitudinal extension.

3-421. The Surface Impedance of Superconductors and Normal Metals at High Frequencies. Part I. Resistance of Superconducting Tin and Mercury at 1200 Megacycles per Sec. Part II. The Anomalous Skin Effect in Normal Metals. Part III. The Relation Between Impedance and Superconducting Penetration Depth. A. B. Pippard. *Proceedings of the Royal Society (Series A),* v. 191, Nov. 18, 1947, p. 370-415.
The technique of resonator measurements. Variations with temperature of the r.f. resistivities of superconducting tin and mercury. Measurements on silver, gold, and tin show that at low temperatures the skin conductivity tends to become independent of the d.c. conductivity. The model of a metal predicts constancy of skin conductivity when the mean free path becomes very long. A formula is derived relating r.f. resistivity to the superconducting penetration depth and other parameters. Penetration depth may be deduced directly from measurements of skin reactance, and a method of measuring reactance is based essentially on variation of the velocity of propagation along a transmission line due to reactance of the conductors. 18 ref.

3-422. M.S. Plates. W. Barr and Constance F. Tipper. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 599-603, 615; discussion, p. 625-627.
Results of notched-bar impact, bend, and tensile tests for a series of mild steel plates. Previously abstracted from *Journal of the Iron and Steel Institute.* See item 3-377.

3-423. Brittle Fracture. W. Barr and A. J. K. Honeyman. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 604-606; discussion, p. 625-627.
Previously abstracted from *Journal of the Iron and Steel Institute.* See item 3-378.

3-424. Notched-Bar Impact; Some Factors Affecting the Properties of Mild Steel. W. Barr and A. J. K. Honeyman. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 606-608; discussion, p. 625-627.
Further investigation of the relationship between, and the significance of, notched-bar impact values and degree of cleavage in the fractures.

3-425. Fluidity of Steel; Relationship to Temperature. R. Jackson, D. Knowles, T. H. Middleham, and R. J. Sarjant. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 609-615; discussion, p. 631-632.
Previously abstracted from *Journal of the Iron and Steel Institute.* See item 3-338.

3-426. Mechanical Properties of Metals. N. F. Mott. *Nature,* v. 160, Nov. 22, 1947, p. 696-698.
Salient points developed at conference at Bristol, England, July 2-9, 1947. 12 ref.

3-427. Penetration of Magnetic Field Into Superconductors. E. Laurmann and D. Shoenberg. *Nature,* v. 160, Nov. 29, 1947, p. 747-748.
Experiments designed to measure the variation with temperature of the penetration depth of a magnetic field into a massive superconductor by measuring at various temperatures the mutual inductance of two coils wound on a superconducting core. Results

for mercury and tin at various temperatures close to absolute zero.

3-428. The Effect of Annealing and Gas Content on the Superconducting Properties of Tantalum. Robert T. Webber. *Physical Review,* v. 72, Dec. 15, 1947, p. 1241-1245.

Superconducting transition temperatures and critical fields of three wires of 99.9% pure tantalum, taken from the same spool, were investigated. Annealing at very high temperatures raised the transition temperature from 4.156 to 4.32° K. and lowered the initial slope of the critical magnetic field from 1360 to 600 gausses per degree. Much sharper transitions were observed for the annealed specimens. The effect of absorbed gas was slight. 13 ref.

3-429. Preliminary Data on Absorption of High Energy Neutrons From the 184-In. Cyclotron. R. Hilderbrand and B. J. Moyer. *Physical Review,* v. 72, Dec. 15, 1947, p. 1258-1260.

Data for concrete, paraffin, graphite, copper, aluminum, and lead.

3-430. The Conductivity of Metals at Microwave Frequencies. B. Serin. *Physical Review,* v. 72, Dec. 15, 1947, p. 1261-1262.

Application of the free-electron theory to the problem of metallic conductivity at microwave frequencies leads to conclusions about the temperature dependence of r.f. conductivity which seem to have been overlooked.

3-431. The Apparent Influence of Grain Size on the High-Temperature Properties of Austenitic Steels. C. L. Clark and J. W. Freeman. *Transactions of American Society for Metals,* v. 38, 1947, p. 148-169; discussion, p. 169-179.

Previously annotated in R.M.L., v. 3, 1946, item 3-216.

3-432. The Development of a Turbosupercharger Bucket Alloy. E. Epremian. *Transactions of American Society for Metals.* v. 39, 1947, p. 261-273; discussion, p. 273-280.

Previously annotated in R.M.L., v. 3, 1946, item 3-214.

3-433. The Stress-Rupture and Creep Properties of Heat Resistant Gas Turbine Alloys. Nicholas J. Grant. *Transactions of American Society for Metals,* v. 39, 1947, p. 281-359; discussion, p. 359-367.

Previously annotated in R.M.L., v. 3, 1946, item 3-215.

3-434. Beryllium in Magnesium Casting Alloys. Jav R. Burns. *Transactions of American Society for Metals,* v. 40, 1948, p. 143-160; discussion, p. 160-162.

See item 3-245.

3-435. Alloy Spring Steels. E. T. Bittner. *Transactions of American Society for Metals,* v. 40, 1948, p. 263-280.

The physical properties of Cr-Ni-Mo (A.I.S.I. 8660), Cr-V (A.I.S.I. 6150), and Si-Mn (A.I.S.I. 9262) alloy steels used for the fabrication of hot formed springs were investigated. A plain carbon spring steel (A.I.S.I. 1095) is included for comparison. Strength properties, ductility, notch sensitivity, hardenability, grain size, oxidation loss, decarburization, fatigue characteristics, and quality of the hot rolled bar stock are considered. The Cr-Ni-Mo steel was equal to or superior to the other alloys in almost all respects, followed by the Cr-V steel.

3-436. The Damping Capacity of Copper-Manganese Alloys. R. S. Dean, E. V. Potter, R. W. Huber, and H. C. Lukens. *Transactions of American Society for Metals,* v. 40, 1948, p. 355-380.

The unusually high damping capacities produced by certain heat treatments were previously reported. These investigations were continued to determine the effects of other heat treatments and the fundamental nature of the damping property, and its variation with heat treatment. Damping capacities and moduli at high and low stresses were determined for alloys quenched from the gamma field and slowly cooled at various rates. The variations in moduli, Poisson's ratio, and damping capacity are correlated. Relationships to the presence of various phases and structural types are indicated.

3-437. The Electrical Resistivity and Temperature Coefficient of Resistance of Copper-Manganese Alloys. R. S. Dean, E. V. Potter, and R. W. Huber. *Transactions of American Society for Metals,* v. 40, 1948, p. 381-400.

Cu-Mn alloys containing 20 to 97% Mn were investigated. Effects of different heat treating, quenching, and working techniques.

3-438. Iron-Manganese Alloys; Properties of Cold Worked and Normalized Alloys Containing 26 to 48% Manganese. J. R. Long, T. R. Graham, and A. H. Roberson. *Transactions of American Society for Metals,* v. 40, 1948, p. 401-419.

Investigation of effects of variations in normalizing temperatures for the different compositions in the above range.

3-439. Cast Heat Resistant Alloys of the 26% Chromium, 20% Nickel Type. Part I. Howard S. Avery and Charles R. Wilks. *Transactions of American Society for Metals,* v. 40, 1948, p. 529-577; discussion, p. 577-584.

See item 3-246.

3-440. The Cobalt-Chromium J Alloy at 1350 to 1800° F. Nicholas J. Grant. *Transactions of American Society for Metals,* v. 40, 1948, p. 585-610; discussion, p. 610-616.

See item 3-247.

3-441. The Effect of Silicon on the Properties of Cast Carbon and Carbon-Molybdenum Steels. N. A. Ziegler, W. L. Meinhart, and J. R. Goldsmith. *Transactions of American Society for Metals,* v. 40, 1948, p. 617-647; discussion, p. 647-648.

See item 3-251.

3-442. Influence of Metallurgical Factors on the Mechanical Properties of Steel. S. A. Herres and C. H. Lorig. *Transactions of American Society for Metals,* v. 40, 1948, p. 775-805; discussion, p. 805-812.

See item 3-249.

3-443. Mechanical Properties of Metals at Low Temperatures; A Survey. L. Seigle and R. M. Brick. *Transactions of American Society for Metals,* v. 40, 1948, p. 813-861; discussion, p. 861-869.

See item 3-248.

3-444. The Fatigue Strength of Binary Ferrites. E. Epremian and E. F. Nippes. *Transactions of American Society for Metals,* v. 40, 1948, p. 870-888; discussion, p. 888-896.

See item 3-250.

3-445. The Effect of Carbon Content on the Hardenability of Boron Steels. G. D. Rahrer and C. D. Armstrong. *Transactions of American Society for Metals,* v. 40, 1948, p. 1099-1112; discussion, p. 1112-1123.

See item 3-244.

3-446. Influence of Nitrogen on the Hardenability and Notch Toughness of Boron-Treated Steels. Thomas G. Digges and Fred M. Reinhart. *Transactions of American Society for Metals,* v. 40, 1948, p. 1124-1146.

End-quench and Charpy impact tests were made. Similar tests were carried out with high-nitrogen steels containing about 0.0015% B and varying amounts of Ti, Cr, or Zr.

3-447. The Influence of Raw Material on the Properties of White-Heart Malleable Cast Iron With Special Reference to the Influence of Residual Elements. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. A89-A111; discussion, p. A111-A114.

3-448. Some Initial Results on the Influence of Tellurium as a Chill-Inducing Medium in Cast Iron. A. N. Sumner. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. B105-B109.

3-449. Some Notes on Hard, War Resisting Cast Irons and Steels. Marcel Ballay and Raymond Chavy. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. A129-A135.

Previously annotated in R.M.L., v. 3, 1946.

3-450. Properties and Characteristics of Common Magnesium Casting Alloys. J. D. Hanawalt, C. E. Nelson, and R. S. Busk. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 77-86.

Previously annotated in R.M.L., v. 2, 1945.

3-451. Comparison of the Common American and European Magnesium Casting Alloys. L. W. Eastwood, James A. Davis, and James DeHaven. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 114-127.

Previously annotated in R.M.L., v. 3, 1946.

3-452. Effect of Composition on Mechanical Properties of Sand-Cast Copper-Tin-Lead-Zinc Alloys. W. T. Battis. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 213-216.

Previously annotated in R.M.L., v. 2, 1945.

3-453. Gray Iron Wear Resistance. F. G. Sefing. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 394-395.

Previously annotated in R.M.L., v. 3, 1946.

3-454. Fatigue Tests on Some Additional Copper Alloys. Alton R. Anderson, Emery F. Swan, and Earl W. Palmer. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 678-690; discussion, p. 691-692.

A previous paper presented correlated endurance and tension-test results for a number of hard drawn Cu-base alloys. The present paper includes similar data on several other commercially important Cu-base alloys, and also data on some of the original alloys in the annealed condition or in additional tempers. Pertinent information regarding composition, fabrication, structure, and other properties is also included. The data presented here and in the previous paper indicate that for phosphor bronzes the optimum amount of cold working for best endurance behavior decreases with increase in tin content. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

3-455. The Notch Sensitivity in Fatigue Loading of Some Magnesium-Base and Aluminum-Base Alloys. George H. Found. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 715-734; discussion, p. 734-737.

Fatigue tests of the rotating-beam, axial-loading, and plate-bending types were performed on a number of commercial magnesium and aluminum-base alloys. The results are not believed to be directly applicable for quantitative design purposes. They are

used, however, to draw general conclusions regarding the use of magnesium and aluminum under various conditions of stress concentration, temperature, and required life. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

3-456. The Fatigue Properties of Beryllium-Copper Strip and Their Relation to Other Physical Properties. G. R. Gohn and S. M. Arnold. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 741-775; discussion, p. 776-782.

Results of a series of fatigue tests made on several lots of Be-Cu strip, ranging in thickness from 0.020 to 0.040 in. Specimens of several tempers were tested unaged and after a variety of precipitation hardening treatments. Alloys containing as little as 1.80% Be hardened satisfactorily and had essentially the same fatigue properties as those containing higher percentages. Increasing the nickel content to 2% did not impair the tensile or fatigue properties. Effects of aging, buffing, pickling, polishing, and short-time heat treatments were determined. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

3-457. The Fatigue Strength of Some Magnesium Sheet Alloys. L. R. Jackson and H. J. Grover. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 783-795; discussion, p. 796-798; also **The Fatigue Strength of Lap Joints in Some Magnesium Sheet Alloys,** *Symposium on Testing of Parts and Assemblies, American Society for Testing Materials,* 1947, p. 2-10; discussion, p. 11.

3-458. Fatigue Tests of Rail Steel Under Compressive Stress. R. S. Jensen and H. F. Moore. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 799-806; discussion, p. 807-813.

Tests were made on T-shaped specimens cut from a rail web under cycles of stress varying from compressive stress to tensile stress equal to 20% of the compressive stresses. A vibratory testing machine was used. Fractures started on the compression side of the specimen and the compressive stresses were about 77% higher than the stresses in specimens subjected to cycles of completely reversed bending stress. Tests of specimens with stamped letters at the critical section on the compression side resulted in reduced stresses at fracture. The fatigue strength of shot-peened specimens was approximately 32% greater than for as-rolled specimens. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

3-459. Investigation of Materials for Marine Propellers. William C. Stewart and W. Lee Williams. *American Society for Testing Materials Proceedings,* v. 46. 1946, p. 836-845.

Results of tests on 32 materials, mostly cast, which have been used or proposed for use in marine propellers, including determinations of chemical compositions and mechanical properties. In addition, the alloys were examined from the standpoint of resistance to salt-water corrosion, salt-water cavitation, and the effects of simultaneous cyclic stress and salt-water corrosion. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

3-460. The Effect of Carbide Spheroidization Upon the Rupture Strength and Elongation of Carbon-Molybdenum Steel. S. H. Weaver. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 856-866; discussion, p. 867-869.

Specimens from a plate of C-Mo steel were treated to obtain 12 different conditions by varying the heat treatment and the amount of spheroidization. Each condition of the steel had been previously tested in long-time creep at 900 and 1000° F. In this investigation, specimens in the 12 different conditions were subjected to long-time rupture-stress and elongation tests at 900 and 1000° F. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

3-461. Influence of Strain Rate and Temperature on the Mechanical Properties of Monel Metal and Copper. D. J. McAdam, Jr., G. W. Geil, and D. H. Woodard. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 902-950.

A study was made of the influence of temperature and strain rate on second-stage flow stress, ultimate stress, technical cohesive strength, and ductility. By combining these results with previously published data, the view is broadened to include a temperature range from 188° C. to the melting point of monel metal and copper. In previous papers, it has been shown that the technical cohesion limit and the flow stress are similarly affected by either the stress system, amount of plastic deformation, or temperature. In this paper, it is shown that these two strength indices are similarly affected by the strain rate. 31 ref. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

3-462. Compressive Properties of Aluminum Alloy Sheet at Elevated Temperatures. Alan E. Flanigan, Leslie F. Tedsen, and John E. Dorn. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 951-967; discussion, p. 968-

969; also *Symposium on Materials for Gas Turbines (American Society for Testing Materials)*, 1946, p. 161-177; discussion, p. 178-179.

Apparatus developed for compression testing of sheet materials at elevated temperatures includes a testing fixture, a special extensometer, and an oil-bath furnace. The short-time compressive properties of five high-strength aluminum-alloy sheet materials were determined at temperatures up to 300° F. after exposures from ½ to 1000 hr. Of the materials tested, the members of the 24S-T8 series appear to offer the best possibilities for elevated-temperature service. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

3-463. **Tensile and Creep Strengths of Some Magnesium-Base Alloys at Elevated Temperature.** A. A. Moore and J. C. McDonald. *American Society for Testing Materials Proceedings*, v. 46, 1946, p. 970-988; discussion, p. 989; also *Symposium on Materials for Gas Turbines (American Society for Testing Materials)*, 1946, p. 180-198; discussion, p. 199.

Creep tests up to and including rupture were carried out for periods of 1000 hr. Several commercial alloys, as well as some experimental cerium-containing alloys, were studied. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

3-464. **Creep Tests on Some Extruded Lead and Lead-Alloy Sleeves and Tapes.** G. R. Gohn, S. M. Arnold, and G. M. Bouton. *American Society for Testing Materials Proceedings*, v. 46, 1946, p. 990-1020; discussion, p. 1021-1024.

Creep test cover a period of approximately 8 yr. on specimens from 16 commercial lead cable sleeves of 6 different compositions and from 14 experimental Pb-alloy tapes. The data show that chemical lead sleeves are more resistant to creep than Pb-Sn or Pb-Sb sleeves at low stresses but not at high stresses. For the tape specimens, a similar relationship was found except that high-Ca alloys are superior to chemical lead in creep resistance at all stresses. High-purity, fire-refined lead, which contains smaller percentages of minor constituents than chemical lead, was inferior to chemical lead at all stresses. 13 ref. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

3-465. **The Brinell Hardness of Gray Cast Iron and Its Relation to Some Other Properties.** J. T. MacKenzie. *American Society for Testing Materials Proceedings*, v. 46, 1946, p. 1025-1036; discussion, p. 1037-1038.

Data contributed by seven companies obtained from both experimental heats and actual operations. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

3-466. **Atmospheric and Indoor Aging Studies on Some Aluminum and Zinc-Base Die-Casting Alloys.** G. R. Gohn and Lucille E. Menges. *American Society for Testing Materials Proceedings*, v. 46, 1946, p. 1064-1094; discussion, p. 1095-1096.

Results of indoor and outdoor aging studies covering 15 yr. on 12 Al and 9 Zn-base die-casting alloys. The studies indicate that there was very little difference in the effect of indoor or outdoor aging on the physical properties of the Al-base alloys. On the other hand, all of the 9 Zn-base alloys showed marked losses in physical properties during the same period of time. For most of the Zn-base alloys, the losses on outdoor aging were only slightly greater than indoors. 16 ref. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

3-467. **The Notch Sensitivity in Static and Impact Loading of Some Magnesium-Base and Aluminum-Base Alloys.** J. P. Doan and J. C. McDonald. *American Society for Testing Materials Proceedings*, v. 46, 1946, p. 1097-1118.

The effect of a wide variety of stress concentrations and loading conditions on the strength, ductility, and toughness of a number of Mg and Al-base alloys. An attempt was made to draw general conclusions which would aid in estimating the performance of these materials under load. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

3-468. **Cracking of Welded Gas Mains.** L. Reeve. *Symposium on Metallurgy of Steel Welding (British Welding Research Assoc.)*, 1947, p. 102-103; discussion, p. 103-104.

Tentative conclusions of an investigation of the causes of cracking in mains and other vessels associated with the treatment of crude town and coke-oven gas, and methods for its prevention. Cracking is believed to be caused by one or more of the constituents of crude ammoniacal liquor, in connection with the presence of a minimum amount of stress.

3-469. **Zirconium Metal, Its Manufacture, Fabrication and Properties.** Donald B. Alnutt and Charles L. Scheer. *Transactions of the Electrochemical Society*, v. 88, 1945, p. 195-204; discussion, p. 204-205.

Previously annotated in R.M.L., v. 3, 1946.

3-470. Heat Resisting Metals for Gas-Turbine Parts. Howard C. Cross and Ward F. Simmons. *Symposium on Materials for Gas Turbines (American Society for Testing Materials),* 1946, p. 3-51; discussion, p. 121-128.

Results of high-temperature tests on various heat resisting alloys. The materials studied ranged from modified 18%-Cr, 8%-Ni steels to practically iron-free Co-Cr and Co-Cr-Ni alloys with additions singly or in combination of Mo, W, Cb, Ta, Ti, Al, B, and N_2. Short-time tension tests were made on the precision-cast, Co-base alloys at 1000 to 1600° F. Stress-rupture tests were made at 1500, 1600, and 2000° F. for times varying from 100 to 1000 hr. Creep tests were made at 1350, 1500, and 1600° F. to determine the stresses required to produce creep rates of 0.00001% per hr.

3-471. Chromium-Base Alloys. Robert M. Parke and Frederick P. Bens. *Symposium on Materials for Gas Turbines (American Society for Testing Materials),* 1946, p. 80-98; discussion, p. 121-128.

Results of an investigation of Cr-base alloys sponsored by the War Metallurgy Committee of the N.D.R.C., at Climax Molybdenum Co. Heat resistant metals being sought were for use as gas-turbine blades rotating in an oxidizing atmosphere at temperatures up to 1600° F. The alloys were also applied experimentally as erosion resistant materials for ordnance uses.

3-472. Metallurgy of High-Temperature Alloys Used on Current Gas Turbine Designs. F. S. Badger, Jr., and W. O. Sweeny, Jr. *Symposium on Materials for Gas Turbines (American Society for Testing Materials),* 1946, p. 99-112; discussion, p. 121-128.

The two high-temperature alloys most widely used during World War II were not developed as a result of the war program, but were available at the beginning of the war. These two alloys —one nickel-base and the other cobalt-base—were used, with only slight modification, in equipment actually used during the war. The development of these alloys, one wrought and one cast and their successful fabrication by forging and by precision casting.

3-473. Alloys and Ceramic Materials for High-Temperature Service. Howard C. Cross. *Symposium on Materials for Gas Turbines (American Society for Testing Materials),* 1946, p. 113-120; discussion, p. 121-128.

A progress report and an outline of the program for future work for the Office of Research and Inventions, U. S. Navy Dept., at Battelle Memorial Institute. Engineering properties of heat-resisting alloys; chromium-base alloys; fundamental factors promoting high-temperature strength of alloys; causes of cracking in welds and adjacent parent metal; weldability of heat-resisting alloys; and fundamental studies of ceramic materials.

3-474. High-Temperature Alloys Developed for Aircraft Turbo-Superchargers and Gas Turbines. J. W. Freeman, E. E. Reynolds, and A. E. White. *Symposium on Materials for Gas Turbines (American Society for Testing Materials),* 1946, p. 52-79; discussion, p. 121-128.

Alloys developed during work for the N.A.C.A. at the University of Michigan.

3-475. Fatigue Characteristics of Magnesium Castings. George H. Found. *Symposium on Testing of Parts and Assemblies (American Society for Testing Materials),* 1947, p. 12-22; discussion, p. 23-24.

The fatigue characteristics as determined both from laboratory tests and service experience. These pertain to the relative importance of mechanical surface condition, design, surface and sub-surface metallurgy, and residual stresses.

3-476. Young's Modulus — Its Metallurgical Aspects. David J. Mack. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 68-84; discussion, p. 84-85.

Previously annotated from *Metals Technology,* Dec. 1945, T.P. 1936 in R.M.L., v. 3, 1946.

3-477. Solubility of Carbon in Molten Copper. Michael B. Bever and Carl F. Floe. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 128-141; discussion, p. 141-143.

Previously appeared in *Metals Technology,* Sept. 1945, T.P. 1802. 20 ref.

3-478. Effect of Phosphorus, Arsenic, Sulphur and Selenium on Some Properties of High-Purity Copper. J. S. Smart, Jr., and A. A. Smith, Jr. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 144-156; discussion, p. 156.

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3-479. The Effect of Phosphorus on the Properties of Gun Metal — Reducing Conditions. Robert A. Colton and Blake M. Loring. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 157-169; discussion, p. 169-170.

Previously annotated from *Metals Technology,* June 1946, T.P. 1974 in R.M.L., v. 3, 1946.

-480. Physical Properties of Copper-Ianganese-Zinc Alloys Containing 60% ʼopper and 5 to 25% Manganese. R. S. Dean, J. R. Long, T. R. Graham and R. ; Feustel. *Transactions of the Ameri-an Institute of Mining and Metallurgi-al Engineers (Institute of Metals Divi-ion),* 1946, p. 185-196.

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-481. Tensile Properties of Aluminum-lloy Sheet at Elevated Temperatures. lan E. Flanigan, Leslie F. Tedsen, and ohn E. Dorn. *Transactions of the merican Institute of Mining and Met-llurgical Engineers (Institute of Metals Division),* 1946, p. 197-215; discussion, p. 15.

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-482. Correlation of Mechanical Prop-rties and Corrosion Resistance of 24S-ype Aluminum Alloys as Affected by ligh-Temperature Precipitation. W. D. ʼobertson. *Transactions of the Ameri-an Institute of Mining and Metallurgi-al Engineers (Institute of Metals Divi-ion),* 1946, p. 216-241; discussion, p. 241.

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-483. Properties of Cerium-Containing Iagnesium Alloys at Room and Ele-ated Temperatures. T. E. Leontis and . P. Murphy. *Transactions of the merican Institute of Mining and Met-llurgical Engineers (Institute of Metals ivision),* 1946, p. 295-326; discussion, p. 26-327.

Previously annotated from *Metals Technology,* April 1946, T.P. 1995 in R.M.L., v. 3, 1946.

3-484. Susceptibility of Four Magnesium Casting Alloys to Microporosity and Its Effect on the Mechanical Properties. Jay R. Burns. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 328-345; discussion, p. 345.

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3-485. Some Properties of Sand-Cast Alloys in the Magnesium-Rich Corner of the Magnesium-Aluminum-Zinc System. R. S. Busk and R. F. Marande. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 346-364; discussion, p. 364-368.

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3-486. Effect of Copper and Some Other Metals on the Gold-Germanium Eutectic. Robert I. Jaffee and Bruce W. Gonser. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 436-443.

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3-487. The Effect of Manganese on the Properties of Cast Carbon and Carbon-Molybdenum Steels. N. A. Ziegler, M. L. Meinhart, and J. R. Goldsmith. *Transactions of the American Society for Metals,* v. 38, 1947, p. 398-485; discussion, p. 485-487.

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3-480. Physical Properties of Copper-Manganese-Zinc Alloys Containing 60% Copper and 5 to 25% Manganese. R. S. Dean, J. R. Long, T. R. Graham and R. G. Feustel. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 185-196.
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3-482. Correlation of Mechanical Properties and Corrosion Resistance of 24S-Type Aluminum Alloys as Affected by High-Temperature Precipitation. W. D. Robertson. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 216-241; discussion, p. 241.
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Previously annotated in R.M.L., v. 3, 1946, item 3-217.

SECTION IV

STRUCTURE

Metallography and Constitution

4-1. Carbon Absorption of 18-8 at High Temperatures. Wilson G. Hubbell. *Steel*, v 119, Dec. 30, 1946, p. 86, 88, 90.

In spite of carbon pickup and the formation of structures containing precipitated carbides, intergranular corrosion does not occur nor is failure of parts due to these causes.

4-2. Grain Boundaries in Metals. P. J. E. Forsyth, G. J. Metcalfe, R. King, and B. Chalmers. *Nature*, v. 158, Dec. 14, 1946, p. 875-876.

Theory of structure of these boundaries. Photomicrographs of copper-beryllium alloys and of an aluminum-magnesium alloy illustrate differences in the way in which precipitation occurs. Formation of boundary grooves on polished metal surfaces at elevated temperatures.

4-3. Sur la Production de Fissures dans l'Aluminium au Cours de la Solidification. (Formation of Fissures in Aluminum During Its Solidification.) H. Jolivet and M. Armand. *Comptes Rendus*, v 223, Nov. 4, 1946, p. 726-727.

Formation of intergranular fissures has been observed in commercial aluminum (99.5%). The formation of such fissures is stimulated by the brittleness caused by the presence of impurities such as silicon, by the high rate of cooling and by internal stress in connection with the presence of gases dissolved in the liquid metal.

4-4. Action des Impuretés sur les Transformations Allotropiques du Cérium Metallique. (Influence of Impurities on the Allotropic Transformation of Metallic Cerium.) F. Trombe and M. Foex. *Comptes Rendus*, v. 223, Dec. 2, 1946, p. 949-950.

The transformations of cerium into the beta form were investigated. Upper limit of existence of the beta form was found to be above 250° C. Spontaneous transformation to this form has been observed in the ingots on a few months storage. Presence of calcium favors the transformation, while iron and aluminum inhibit it.

4-5. On the Exchange Interaction of the Valence and Inner Electrons in Ferromagnetic (Transition) Metals. S. Vonsovsky. *Journal of Physics (U.S.S.R.)*, v 10, no. 5, 1946, p. 468-475. (In English.)

Approximate theory of the interaction of valence and inner electrons in ferromagnetic metals. 15 ref.

4-6. Sulphur in Cast Iron. H. Morrogh. *Engineering*, v. 162, Dec. 20, 1946, p. 598-600; Dec. 27, 1946, p. 621-623.

Work was undertaken to determine the extent to which nickel, molybdenum, copper, chromium, and aluminum, which form fairly stable sulphides, would combine with sulphur in cast iron. A large number of experimental melts were made. Resulting structures are shown in micrographs.

4-7. Stress-Induced Preferential Orientation of Pairs of Solute Atoms in Metallic Solid Solution. Clarence Zener. *Physical Review*, v. 71, Jan. 1, 1947, p. 34-38.

An analysis is given of one source of anelasticity which has heretofore been overlooked, the relaxation of the preferential orientation of pairs of solute atoms. Theory for dependence of anelastic effects upon temperature and upon crystallographic orientation. Theory illustrated by reference to previously reported alpha-brass internal friction observations.

4-8. Sur une Double Structure de l'Acier. (Concerning a Double Crystal Structure in Steel.) L. Colombier. *Comptes Rendus*, v. 223, Dec. 9, 1946, p. 999-1001.

A hypothesis consisting of an assumption that in any steel there is present a superposition of two crystal

structures. The metal may be of martensite, sorbite, or troostite structure, but superposed on this structure there is said to be a structure of different composition, which is determined by the former austenitic structure.

4-9. The Mechanical Properties of Metallic Solid Solutions. F. R. N. Nabarro. *Proceedings of the Physical Society*, v. 58, Nov. 1, 1946, p. 669-676.

The theoretical relation between lattice strains produced by precipitation in a metal and the corresponding increase in hardness is extended to lattice strains in metallic solid solutions. The elastic limit of a single crystal of a solid solution is calculated on the assumption that the crystal will slip when the applied external stress is equal to the mean value of the internal stress. Similar considerations are applied to the hardness of polycrystalline solid solutions. The theory is extended to cases in which the increase of hardness produced by alloying is not large in comparison with the hardness of the pure solvent. 27 ref.

4-10. Etude de la Recristallisation du Zinc. (Study of Zinc Recrystallization.) C. Crussard and F. Aubertin. *Metaux et Corrosion*, v. 21, April 1946, p. 45-53.

Evolution of nuclei and new crystals during the process of recrystallization and factors causing their formation and growth.

4-11. The Structure of Real Crystals. Kathleen Lonsdale. *Science Progress*, v. 35, Jan. 1947, p. 1-11.

A critical review. Many references throughout the text.

4-12. Investigation of the Ternary System Copper-Nickel-Lead. V. A. Nemilov and I. A. Stemina. *Journal of Applied Chemistry (U.S.S.R.)*, v. 19, no. 5 and 6, 1946, p. 449-460. (In Russian.)

Results of an investigation of five sections of the system. They were obtained by tests and by thermal microstructure analysis. 15 ref.

4-13. Summarized Proceedings of Conference on X-Ray Analysis, London, 1946. *Journal of Scientific Instruments*, v. 24, Jan. 1947, p. 1-21.

Summaries of some of the papers presented by scientists and crystallographers from each of the following countries: Belgium, Czechoslovakia, Finland, France, Germany, Austria, Great Britain, Holland, India, Norway, Sweden, United States, and Russia. Discussions. 218 ref.

4-14. Metal Electrons and Catalysis. George-Maria Schwab. *Transactions of the Faraday Society*, v. 42, Nov. 1946, p. 689-697.

A new method for measurement of temperature coefficients of formic acid dehydrogenation with alloy catalysts is described and applied to homogeneous and heterogeneous alloys of silver, gold and copper with other metals. Relation to modern theories of the atomic structure of metals, especially those of Hume-Rothery.

4-15. Carbide Structures in Carburized Thoriated Tungsten Filaments. C. W. Horsting. *Journal of Applied Physics*, v. 18, Jan. 1947, p. 95-102.

A wide variety of carbide structures was found in the surface layer of these filaments. Their origin was traced to carburizing conditions and subsequent processing. A frequently occurring laminated structure was found to contain less carbon than W_2C. The thyratron-relay method of carburizing control is critically reviewed. Abnormal filament current in manufactured tubes is believed to be caused by surface conditions which cause changes in thermal emissivity.

4-16. The Effect of Supersonic Waves on the Solidification of Molten Metals. S. Sokoloff. *Ministry of Aircraft Production R.T.P. Translation No. 2568*, 4 p.

Effect of supersonic waves on crystallization of zinc with emphasis on rate of formation and growth of crystals and nature of the growth. Apparatus and technique used. Micrographs and macrographs show structure before and after exposure. Supersonic exposure results in a more dendritic structure. (From report issued by the Electro-Technical Institute, Leningrad.)

4-17. Etude de la Recristallisation du Zinc. (Study of Zinc Recrystallization.) Parts IV and V. (Concluded.) C. Crussard and F. Aubertin. *Métaux et Corrosion*, v. 21, May 1946, p. 66-72.

Results of Mehl's research on recrystallization of aluminum are compared with those obtained by the authors with zinc. Dependence of grain growth of zinc on temperature was found to be similar to that of aluminum; the most favorable temperature was around 250° C.

4-18. Interpretation Métallographique de l'Instabilité des Ferronickels Réversibles. (Metallographic Interpretation of the Reversible Instability of Ferronickels.) P. Chevenard. *Comptes Rendus*, v. 223, Dec. 23, 1946, p. 1073-1076.

A metallographic study of the instability of iron-nickel alloys. To minimize instability, it is recommended that less than 0.05% carbon be used, that titanium or vanadium be added to retard the dissolution of cementite during heat treatment, and that the finished products be treated so as to eliminate tendencies toward precipitation.

4-19. X-Ray Analysis of Chromium-Molybdenum and Chromium-Tungsten

Alloys. W. Trzebiatowsky, H. Ploszek and J. Lobzowski. *Analytical Chemistry*, v. 19, Feb. 1947, p. 93-95.

The structures of the above alloy systems were investigated by means of chemical and X-ray analyses. Lattice constants and melting points. Results compared with those obtained by other investigators. 12 ref.

4-20. Some Mathematical Considerations and Experiments Concerning the Shape of Pipes in Ingots. E. W. Fell. *Journal of the Institute of Metals*, v. 73, Jan. 1947, p. 243-262.

Analysis of the shape of pipes formed in a mass of substance on freezing. The shapes of pipes in an upright and finite cylindrical block, when cooling proceeds from the vertical sides only and from the vertical sides and a flat bottom, were determined mathematically, and a comparison is made with natural pipes formed in aluminum alloys. The position of the solid-liquid interface in a finite cylindrical block of aluminum, cooling from the vertical sides and flat bottom, was determined mathematically. Periodic variations of the surface of pipes, and pipes and cavities formed by freezing of masses of spherical shape are considered.

4-21. A Theory of the Age Hardening of Aluminum - Copper Alloys, Based on Vacant Lattice Sites. F. Rohner. *Journal of the Institute of Metals*, v. 73, Jan. 1947, p. 285-321.

Results of an investigation of age hardening at room temperature of four different high-purity alloys of the duralumin type by measurements of tensile properties and electrical resistivity. An investigation of the aging of duralumin-type alloys at 100° C., directly after quenching, and after initial aging at room temperature. Results are in good agreement with the theory of vacant lattice sites.

4-22. Carbide Instability of Carbon-Molybdenum Steel Piping. R. W. Emerson. *Welding Journal*, v. 26, Feb. 1947, p. 104s-114s.

Results of an investigation of the complete failure of a carbon-molybdenum steel steam pipe adjacent to a weld revealed the failure to be the result of graphite segregation.

4-23. Interaction of the Valence and Inner Electrons in Ferromagnetic Transition Metals. C. V. Vonsovsky. *Journal of Experimental and Theoretical Physics*, v. 16, no. 11, 1946, p. 981-989. (In Russian.)

In the vicinity of the Curie point, where the magnetization changes markedly, there must be a substantial alteration in the effective mass and distribution of valence electrons.

4-24. A Thermodynamic Theory of the Fracture of Metals. Edward Saibel. *Metals Technology*, v. 14, Feb. 1947, T. P. No. 2131, 17 p.

General theory for the fracture of metals from the thermodynamic point of view. The theory developed leads to numerical results that compare favorably with experimental values obtained in the case where plastic flow precedes fracture as well as with earlier theoretical calculations for brittle strength. 29 ref.

4-25. Rontgenographische Untersuchung uber Gitterstorungen bei Verschiedenen Bruch-Ursachen und-Mechanismen an Aluminium-Legierungen. (X-ray Investigation of Lattice Disturbances in Aluminum Alloys Fractured under Different Conditions.) F. Rohner. *Schweizer Archiv*, v. 13, Jan. 1947, p. 14-21.

Through X-ray determination of lattice disturbances, information concerning the type of fracture and the causes of fracture may be obtained.

4-26. Influence of the Character and Duration of Crystallization on the Mobility of Molten Metal Between the Growing Crystals During Solidification. A. A. Botehvur and V. V. Kuzina. *Bulletin of the Academy of Sciences of U.S.S.R.*, Section of Technical Sciences, no. 10, 1946, p. 1459-1462. (In Russian.)

During investigation of the rate of crystallization of molten steel, it was noticed that the crust formed on the sides of the mold does not correspond to the marked dendritic character of steel. Further investigation shows that homogeneity of the castings depends to a large degree on the crystal structure of the liquid-metal interface between the solidified part around the outside of the mold and the molten interior portion and upon the amount of circulation of the molten part during the process.

4-27. The Influence of Crystal Face on the Electrochemical Properties of a Single Crystal of Copper. Henry Leidheiser, Jr. and Allan T. Gwathmey. *Electrochemical Society Preprint 91-6*, 1947, 11 p.

Importance of crystal face in several electrolytic processes in a copper sulphate-sulphuric acid solution investigated with the aid of electrolytically polished single crystals of copper. The processes studied were simple chemical etching, electroetching, electrodeposition, action of an alternating current, action of an alternating current superimposed on a direct current, and electrolytic replacement. It was found that all of these processes were influenced greatly by the crystal face exposed at the surface. The nature of the surrounding atmosphere was found to influence the physical form of the electrodeposit.

4-28. A Note of the Mode of Occurrence of Tellurium in Cast Iron. H. Morrogh.

Journal of the Iron and Steel Institute, v. 155, Jan. 1947, p. 21-23.

By means of the polarizing microscope it is shown that in the presence of an excess of manganese over that required to neutralize the sulphur, tellurium forms manganese ditelluride. With no manganese or with insufficient manganese to balance the sulphur, iron monotelluride is formed. Various aggregates of manganese sulphide, manganese ditelluride, iron sulphide, and iron telluride are described.

4-29. Determination of Austenite Grain Size in Cast Steels. M. F. Hawkes. *Iron Age,* v 159, March 13, 1947, p. 46-51.

Description and evaluation of a number of methods for rating grain size, including fracture, oxidation, normalizing, gradient quench, martensitic etch and the McQuaid-Ehn methods. General characteristics of grain size in cast steels.

4-30. The Relations Between Segregation Structure and Porosity in Chill-Cast and in Sand-Cast Ingots of 10% Tin Bronze. W. T. Pell-Walpole and V. Kondic. *Metallurgia,* v. 35, Feb. 1947, p. 181-187.

A chill-cast 10% tin bronze ingot, degassed and poured under optimum conditions for soundness into a water-cooled copper-faced mold, exhibited marked inverse segregation, increasing in severity from the base to the top of the ingot. Explanation for this type of segregation; segregation in a sound ingot of this type can be reduced by annealing at a temperature of 800° C. Comparison is made with a sand-cast ingot of similar composition and poured under the same conditions.

4-31. La Structure Cristalline Facteur des Réactions dans L'Etat Solide. (Crystal Structure as a Factor in Solid State Reactions.) J. Bénard. *Bulletin de la Société Chimique de France,* Sept-Oct. 1946, p. **511-521.**

A critical survey of the literature on metallic solid-solution reactions, especially the experimental results reported. General deductions from the survey. The concept of geometric inertia and a rational classification of transformations taking place. Tables and diagrams. 35 ref.

4-32. The Microstructure of Wrought Nonarsenical Phosphorus-Deoxidized Copper Containing Small Quantities of Bismuth. T. H. Schofield and F. W. Cuckow. *Journal of the Institute of Metals,* v. 73, Feb. 1947, p. 377-384.

Brittleness of cold worked nonarsenical phosphorus-deoxidized copper containing small quantities of bismuth after quenching from 550° C. appears to be associated with films which are mainly present in the grain boundaries and are revealed by electrolytic polishing. Material quenched from 750° C. is not brittle and does not show such films. Brittle material showing films can be rendered ductile and free from films by quenching from 750° C. Precise nature of these films has not been established, but it is probable that they consist of bismuth or of a constituent containing bismuth.

4-33. Diffusion of Carbon Into Tungsten. M. Pirani and J. Sandor. *Journal of the Institute of Metals,* v. 73, Feb. 1947, p. 385-395.

Experiments were carried out with fused tungsten carburized at a series of temperatures. Extent of carbide formation was determined and values of the diffusion coefficient calculated. The activation energy of diffusion is 59,000 cal. per gram-atom. Examination of the microstructure of the carburized tungsten failed to provide evidence of grain-boundary diffusion. From X-ray powder photographs of the surface of the carburized tungsten it was concluded that the carburized zone is mainly WC, with a very small amount of residual beta tungsten. The mechanism of diffusion is discussed.

4-34. The Constitution of the Aluminum-Rich Aluminum-Iron-Nickel Alloys. G. V. Raynor and P. C. L. Pfeil. *Journal of the Institute of Metals,* v. 73, Feb. 1947, p. 397-419.

In view of differences between previously published diagrams for the aluminum-rich alloys of the system aluminum-iron-nickel, the system was re-examined by micrographical and X-ray methods, and additional data were obtained by the analysis of primary crystals extracted from slowly cooled alloys. Isothermal sections were determined at 600 and 550° C., and the general form of the previously published diagrams was confirmed Differences exist, however, between the positions of the phase boundaries at equilibrium and after slow cooling. Results discussed in connection with the theory of the behavior of transitional metals in alloys.

4-35. Nature of the Steel Strengthening Process and of the High Hardness of Martensite. S. T. Kishkin. *Bulletin of the Academy of Sciences of U.S.S.R.,* Section of Technical Sciences, no. 12, 1946, p. 1799-1807. (In Russian.)

Highly dispersed iron carbides are formed during plastic deformation of steels. Strengthening of steels by cold working or heat treatment is caused by the blocking of slippage in the crystal structure by carbide formation Coagulation of carbides reduces the strength of the steel. Martensite hardness is believed to be caused by the formation of microparticles of iron

carbides during hardness testing on account of their deformation.

4-36. A Velocity-Modified Temperature for the Plastic Flow of Metals. C. Zener and J. H. Hollomon. *Journal of Applied Mechanics,* v. 14, March 1947, p. A-70-A-71.

Discussion of paper by C. W. MacGregor and J. C. Fisher, published in March 1946 issue, and author's reply. Questions the equation used to relate stress, strain, strain rate, and temperature.

4-37. Fractographic Structures in Zinc. Carl A. Zapffe. *Metal Progress,* v. 51, March 1947, p. 428-431.

Excellent photographs by George A. Moore of Battelle Memorial Institute show natural cleavage structure at 250 and 500 diameters. The features revealed indicate that zinc fractures similarly to bismuth.

4-38. L'Existence de Phenomènes de Retard Thermique a la Solidification pour l'Aluminium Raffiné a 99.99% et Son Application a la Préparation de Cristaux Uniques. (The Presence in Refined Aluminum (99.99% Pure) of the Phenomenon of Thermal Solidification Delay, and Its Application in the Production of Monocrystals.) Paul Lacombe and Louis Beaujard. *Comptes Rendus,* v. 224, Jan. 13, 1947, p. 116-118.

The phenomenon of supercooling of aluminum and the method of production of aluminum monocrystals based on this phenomenon.

4-39. Further Observation of Graphitization in Aluminum-Killed Carbon-Molybdenum Steel Steam Piping. R. W. Emerson and Matthew Morrow. *Welding Journal,* v. 26, March 1947, p. 139s-149s.

Results of a macroscopic and microscopic examination of several joint failures from the Springdale Power Station, in which a graphitization condition different from anything previously encountered was found. The segregation had occurred along slip planes where local yielding or plastic deformation had previously occurred. Theories to explain the results observed, and also to explain isothermal graphitization. 22 ref.

4-40. Atomic Radii and Interatomic Distances in Metals. Linus Pauling. *Journal of the American Chemical Society,* v. 69, March 1947, p. 542-553.

An equation was developed to express change in metallic radius of an atom with change in bond number or coordination number. This equation was applied to empirical inter-atomic-distance data for the elementary metals to obtain a nearly complete set of single-bond radii. Comparison of these radii with normal covalent radii, tetrahedral radii, and octahedral radii indicates that interatomic forces in metals are mainly due to covalent bonds resonating among available interatomic positions. It was found that chromium, manganese, and tin atoms exist in metals in two forms. Use of the radii is illustrated by discussion of cementite and AuSn.

4-41. Internal Oxidation. F. N. Rhines. *Corrosion and Material Protection,* v. 4, March-April 1947, p. 15-20.

Present status of the knowledge of internal oxidation (subscale formation). The rate of advance of the front of oxidation is controlled cooperatively by the diffusion rates of oxygen and the reacting element. Attempts to show a hardening effect by precipitated oxides, analogous to the age-hardening effect, have been fruitless. Precipitated oxides appear to influence the modes of recrystallization and grain growth.

4-42. The Effect of Temperature on the Intensity of X-Ray Reflection. E. A. Owen and R. W. Williams. *Proceedings of the Royal Society,* v. 188, Feb. 25, 1947, p. 509-521.

Effect of temperature on intensity of X-ray reflection by gold, copper, and aluminum studied by making microphotometric measurements on lines in X-ray structure spectra obtained with powder specimens in Debye-Scherrer camera. A special method was used to make cylindrical powder specimens, 0.8 mm. in diameter, which held together without adhesive and were free from a core of foreign material.

4-43. The Anisotropy of Thermal Expansion as a Cause of Deformation in Metals and Alloys. W. Boas and R. W. K. Honeycombe. *Proceedings of the Royal Society,* v. 188, Feb. 25, 1947, p. 427-439.

Plastic deformation produced by repeated heating and cooling of certain noncubic metals in the range from −190 to 250° C. The extent of the deformation which results from the anisotropy of thermal expansion of individual crystals becomes greater as the temperature range is increased. In order to investigate the interaction between the crystals of the two phases of a duplex alloy during cyclic thermal treatment, experiments were conducted with a series of tin-rich tin-antimony alloys. It was found that deformation in the boundary region between crystals of the two phases was considerably smaller than that in the crystal boundary region of the anisotropic matrix. Similar results were obtained with tin-base bearing alloys. 19 ref.

4-44. The Microstructure of Commercial Acid Resisting Silicon-Iron Alloys. J. E. Hurst and R. V. Riley. *Journal of the*

Iron and Steel Institute, v. 155, Feb. 1947, p. 172-178.

Influence on the microstructure of variations in silicon content, of additions of certain alloying elements, and of adventitious impurities.

4-45. **Diffusion in Solid Metals.** *Metal Industry*, v. 70, March 21, 1947, p. 192-193.

Practical aspects; experimental methods; movements of interface.

4-46. **The Silicon Carbide Addition in Gray Iron Automotive Castings.** E. A. Loria, F. S. Kleeman and A. P. Thompson. *Metal Progress*, v. 51, April 1947, p. 587-592.

A method of inoculation that obtains, in practice, those effects considered essential to the production of automotive castings possessing a very dense grain structure together with a high degree of machinability. Comparison drawn between typical cylinder iron and a similar one treated with silicon carbide. Microstructure has been correlated with properties and performance, which involve machinability, pressure tightness and grain structure.

4-47. **Slow Changes in Hardened Steel.** Victor Kappel. *Metal Progress*, v. 51, April 1947, p. 611-612.

Structural failures, which were the cause of 12% of airplane accidents in 1945, are believed to be the result of sluggish transformation of structural metal, especially when not completely quenched; austenite transforming to troostite and a structure resembling martensite at low temperatures often encountered in planes. Opinion is backed up by experience in investigating the failure of aircraft parts.

4-48. **Primary Binary Solid Solutions.** E. A. Owen. *Journal of the Institute of Metals*, v. 73, March 1947, p. 471-487.

Survey of X-ray measurements of the distortion produced in the crystal lattices of gold, silver, and copper, when the first and second long period elements are dissolved in them.

4-49. **Sur l'Anisotropie Optique des Bronzes et des Alliages Cuivre-Antimoine. (Optical Anisotropy of Bronzes and Copper-Antimony Alloys.)** Theophile Cambon. *Comptes Rendus*, v. 224, March 17, 1947, p. 837-839.

A crystallographic study of optical anisotropy on bronzes and on CuSb alloys of various phases.

4-50. **Internal Friction of Zinc Single Crystals.** Irvin H. Swift and John E. Richardson. *Journal of Applied Physics*, v. 18, April 1947, p. 417-425.

Measurements of the internal friction of single crystals of zinc have been previously reported. The present work consists of further observations of the behavior of the decrement of longitudinally oscillating zinc crystals under various circumstances and with partially controlled history.

4-51. **Preparation and X-Ray Diffraction Studies of a New Cobalt Carbide.** L. J. E. Hofer and W. C. Peebles. *Journal of the American Chemical Society*, v. 69, April 1947, p. 893-899.

The easily hydrogenated carbon produced by the action of CO on finely divided cobalt is shown to be combined with cobalt to form a new crystalline species, Co_2C, whose structure is distinct from either alpha or beta cobalt. X-ray diffraction data indicate that the difficultly hydrogenated carbon is in the form of finely divided carbon crystallites.

4-52. **Electrons, Atoms, Metals and Alloys.** William Hume-Rothery. *Metals Technology*, v. 14, April 1947, T. P. 2130, 16 p.

British scientist describes some of the advances in the theory of the structure of alloys which have been made in the years between the two world wars.

4-53. **Solubility of Carbon in Molten Copper-Manganese and Copper-Nickel Alloys.** John R. Anderson and Michael B. Bever. *Metals Technology*, v. 14, April 1947, T. P. 2151, 10 p.

Investigation conducted by saturating liquid samples of copper-manganese and copper-nickel alloys with carbon. The samples were quenched and analyzed for total carbon by a combustion method. Results charted; their practical value. 14 ref.

4-54. **The Crystal Structure of AuBe.** B. D. Cullity. *Metals Technology*, v. 14, April 1947, T. P. 2152, 5 p.

The structure of the gold-beryllium phase investigated by X-ray diffraction. It was found to be a quite close packed cubic structure, in which the beryllium atoms have forced the gold atoms out of their normal face-centered positions. It is a structure known as the FeSi type.

4-55. **The Constitution of the Bismuth-Indium System.** Otto H. Henry and Edward L. Badwick. *Metals Technology*, v. 14, April 1947, T. P. 2159, 5 p.

The liquidus and solidus curves of the bismuth-indium phase diagram have been located and two eutectics have been placed. Two intermetallic compounds appear to be $BiIn_2$ and BiIn. A new value for the melting point of indium.

4-56. **Experimental Evidence of the Viscous Behavior of Grain Boundaries in Metals.** T'ing-Sui Ke. *Physical Review*, v. 71, April 15, 1947, p. 533-546.

A simple torsional apparatus was devised for measuring four types of anelastic effects at very low stress levels. All four types were studied in 99.91% polycrystalline aluminum as

well as in single crystal aluminum. The effects observed in polycrystalline aluminum are completely recoverable and are linear with respect to applied stress and prior strain. They satisfy the interrelations derived by Zener from Boltzmann's superposition principle within experimental error, and are consistent with the viewpoint that grain boundaries behave in a viscous manner. Similar anelastic effects were also observed in polycrystalline magnesium, indicating that viscous behavior is common to all metals.

4-57. Grain Growth in High Purity Aluminum. Paul A. Beck, Joseph C. Kremer, and L. Demer. *Physical Review,* v. 71, April 15, 1947, p. 555.

Results of measurement of average grain size in specimens heated for various periods of time (20 sec. to 11 days) and at various temperatures (350 to 650° C.) used to derive certain empirical relationships and theoretical hypotheses.

4-58. The deHaas-van Alphen Effect in a Single Crystal of Zinc. Jules A. Marcus. *Physical Review,* v. 71, April 15, 1947, p. 559.

The diamagnetic susceptibility of a single crystal of zinc was measured from 20 to 373° K. in fields ranging from 4.5 to 10.5 kilogauss. At 20° K. the susceptibility perpendicular to the hexagonal axis is independent of the field while the susceptibility parallel to the hexagonal axis shows a marked field dependence.

4-59. Graphite Formation in Cast Iron and in Nickel-Carbon and Cobalt-Carbon Alloys. H. Morrogh and W. J. Williams. *Journal of the Iron and Steel Institute,* v. 155, March 1947, p. 321-371.

A concise statement of as many as possible of the features of graphite formation in cast irons which need explanation, together with a critical examination of numerous theories. The metallography of graphite in relation to its crystal structure and the solidification of flake graphite-containing iron. Process of graphite formation in nickel-carbon, nickel-iron-carbon, and cobalt-carbon alloys, and the analogies between the mechanism of the process in these alloys with that in cast irons. Undercooling of cast irons and of similar alloys. 115 ref.

4-60. Microstructures and Structural Diagrams for Fe-Ni-Cr Alloys. Anton deS. Brasunas and James T. Gow. *Metal Progress,* v. 51, May 1947, p. 777-780.

Forty photomicrographs show structures of series of cast Fe-Ni-Cr alloys containing 0.4% C, 1.2% Si, and 0.8% Mn, annealed 100 hr. at 1800° F. Phase diagrams. The work was done at Battelle Memorial Institute under the sponsorship of the Alloy Casting Inst.

4-61. 18-8 Steel in Exhaust Systems. Wilson G. Hubbell. *Aero Digest,* v. 54, May 1947, p. 92, 95, 145-146.

Results of an investigation of aircraft exhaust manifold failures. It is shown that the metal picks up carbon from the products of combustion, thus theoretically rendering it more liable to intergranular corrosion. However, no evidence of this type of corrosion was found in spite of increased carbon content. The effects of variations in composition and of heat treatment procedures on formability and weldability.

4-62. Structure of Graphite. *Nature,* v. 159, May 10, 1947, p. 637-638.

Separate communications from J. B. Nelson and D. P. Riley and from H. P. Rooksby and E. G. Steard about experiments made to verify the existence of extra lines in the X-ray powder-diffraction pattern of graphite, reported by J. Gibson in a recent issue. In neither case were the reported lines found. The first authors believe Gibson's extra lines were caused by the presence of small amounts of iron, gold, mercury, and tungsten in the cobalt target plating.

4-63. Direct Determination of Stacking Disorder in Layer Structures. W. H. Zachariasen. *Physical Review,* v. 71, May 15, 1947, p. 715-717.

Irregularities in the relative displacement of the layers parallel to their own planes occur in many crystals of layer-structure type. This stacking disorder produces characteristic features in the X-ray and electron-diffraction patterns of such crystals. It is shown that the specific nature of the disorder can be directly deduced from the observed diffraction effects.

4-64. The Theory of Gases in Copper Base Alloys. L. W. Eastwood and J. G. Kura. *Foundry,* v. 75, June 1947, p. 82-83, 260-267.

Some of the fundamental work done on copper-gas systems; the effect of alloy composition, the role of oxygen, the basis for use of an oxidizing atmosphere and other commercial practices, the significance of the equilibrium constant, and the presence of gases in the solid metal. 22 ref.

4-65. On the Recrystallization and Strain-Relieving of 80-20 Cupro-Nickel Alloy. D. P. Chatterjee. *Engineers' Digest (American Edition),* v. 4, May 1947, p 243-244.

Approximate lowest recrystallization temperature range was found to be 450 to 500° C., as shown by study of grain growth and change of hardness, tenacity, and ductility. (Translated from *Journal of the Geological, Mining and Metallurgical Society of India,* v. 18, March 1946, p. 1-4.)

4-66. The Physics of Sheet Steel. G. C. Richer. *Sheet Metal Industries,* v. 24, May 1947, p. 945-952, 962.

The phenomena of plastic deformation and ferromagnetism from a fundamental physical standpoint. Discussion of the physical properties of metals is based on a few essential atomic-lattice factors. (To be cont.)

4-67. German Research on the Fine Structure of Metals. *Metal Treatment,* v. 14, Spring 1947, p. 41.

Outlines B.I.O.S. report by R. H. Cooke, A. H. Jay, N. K. Petch, and W. A. Wood.

4-68. The Application of Single Crystals to the Study of Tempered Martensite. G. Kurdjumov and L. Lyssak. *Journal of the Iron and Steel Institute,* v. 156, May 1947, p. 29-36.

Results of a study of the structure of tempered martensite using an X-ray camera provided with a special arrangement in order to increase its accuracy in measuring lattice constants. The product of the so-called "first transformation" in tempering is shown to be a partly decomposed solid solution of carbon in alpha iron. After tempering at 150° C., 0.3 to 0.5% carbon remains dissolved in the solid solution. It decreases as the tempering temperature rises. The kinetics of martensite decomposition has the character of a reaction of the first order. 15 ref.

4-69. Mecanisme de la Formation de l'Etat Ordonne dans une Solution Solide. (Mechanism of Disorder-Order Transformation in a Solid Solution.) Andre Guinier and Roger Griffoul. *Comptes Rendus,* v. 224, April 21, 1947, p. 1168-1170.

Investigation of the above mechanism in the solid solution $AuCu_3$, using an X-ray method, showed the importance of certain crystalline phases and periodicity in the transformation.

4-70. Absorption of Hydrogen by Aluminum Attacked in Caustic Soda Solution. C. E. Ransley and H. Neufeld. *Nature,* v. 159, May 24, 1947, p. 709-710.

The authors found a concentration of the order of 0.4 cc. per 100 g. of hydrogen dissolved in cast aluminum (99.99%) after immersion in 0.01 *N* caustic soda for 49 days. This is contradictory to the results reported by Moureau and Chaudron *(Comptes Rendus),* who found 1000 cc. per 100 g. of metal after 20 to 30 days absorption.

4-71. The Crystal Structure of SiC(VI) and the Geometrical Theory of the Structure of Silicon Carbide. G. S. Zhdanov and Z. V. Minervina. *Journal of Experimental and Theoretical Physics (U.S.S.R.),* v. 17, no. 1, 1947, p. 3-6. (In Russian.)

The structure is calculated from spectrographic data of Thibault and found to be identical with that predicted by the authors in 1944.

4-72. X-Ray Study of Disorder-Order Transformation in AuCu Alloys. N. N. Buinov. *Journal of Experimental and Theoretical Physics (U.S.S.R.),* v. 17, no. 1, 1947, p. 41-46. (In Russian.)

Results of a study of the temperature dependence of disorder-order transformation and of the axial unit-cell ratio for the above alloys. 16 ref.

4-73. Thermodynamic Activities and Diffusion in Metallic Solid Solutions. C. Ernest Birchenall and Robert F. Mehl. *Metals Technology,* v. 14, June 1947, T.P. 2168, 16 p.

It is shown that activity gradient is more fundamental than concentration gradient in the process of diffusion in copper-zinc and iron-carbon systems, and probably in general. The process of solid metallic diffusion is examined in detail. It is shown that chemical and radioactive methods for determining diffusion rates in substitutional solutions will not measure the same processes if the ratio of radioactive constituent to stable constituent is not the same on both sides of the original interface. 18 ref.

4-74. Interaction and Structure in Copper-Zinc Alloys. C. Ernest Birchenall. *Metals Technology,* v. 14, June 1947, T.P. 2169, 8 p.

Derives from activity data given in the previous paper (see above abstract) for the brasses, and from structural considerations, as much new and detailed information as possible about the interactions between copper and zinc in metallic solid solution and the effect of these interactions in determining the short-range structure of the equilibrium phases. 12 ref.

4-75. Austenite Grain Size in Cast Steels. Malcolm F. Hawkes. *Metals Technology,* v. 14, June 1947, T.P. 2170, 21 p.

More than 50 commercially produced cast steels representing a wide variety of compositions and melting practices were used in the study. For each steel, grain-size determinations were made after each of three widely varying heat treating schedules. The various methods for determining austenite grain size evaluated. An appendix consisting of five tables, giving a complete summary of austenite grain sizes of a variety of carbon and alloy cast steels after heating, has been deposited with the American Documentation Institute from whom microfilm or photocopies may be obtained.

4-76. Discussion, Institute of Metals Division. *Metals Technology,* v. 14, June 1947, T.P. 2187, 40 p.

Twinning in polycrystalline magnesium, by C. S. Barrett and C. T.

Haller. Stress-rupture and creep tests on aluminum-alloy sheet at elevated temperatures, by A. E. Flanigan, L. F. Tedsen and J. E. Dorn. Precipitation in age-hardened aluminum alloys, by A. H. Geisler and F. Keller. The mechanical equation of state, by J. H. Hollomon. The melting of molybdenum in the vacuum arc, by R. M. Parke and J. L. Ham. Some factors affecting particle size of hydrogen-reduced tungsten powder, by Bernard Kopelman. Zinc diffusion in alpha brass, by A. D. Smigelskas and E. O. Bobalek. Hydrogen in magnesium alloys, by R. S. Busk and E. G. Bobalek. Some effects of zirconium on extrusion properties of magnesium-base alloys containing zinc, by J. P. Doan and G. Ansel. An electron diffraction study of oxide films formed on iron, cobalt, nickel, chromium and copper at high temperatures, by E. A. Gulbransen and J. W. Hickman. Solubility of hydrogen in electrolytic manganese and transition points in electrolytic manganese, by E. V. Potter and H. C. Lukens.

4-77. **The Separation of Gases From Molten Metals.** Albert J. Phillips. *Metals Technology,* v. 14, June 1947, T.P. 2208, 30 p.

Quantitative considerations of industrial significance. It is believed that any well-defined gas-metal reaction can be explained, if sufficient data are available, on the basis of simple equilibrium chemistry and the phase rule. The need for exact gas-metal equilibrium data. 17 ref.

4-78. **Fundamental Investigation of Graphitization of Piping.** *Edison Electric Institute Bulletin,* v. 15, May 1947, p. 171-172.

Results of research at Battelle Memorial Institute to date.

4-79. **Tellurium.** H. Morrogh. *Iron and Steel,* v. 20, May 23, 1947, p. 215-216.

Photomicrographs show its mode of occurrence in cast iron.

4-80. **Graphite.** H. Morrogh and W. J. Williams. *Iron and Steel,* v. 20, May 23, 1947, p. 241-257; discussion, p. 288-289.

Results of an extensive study of its formation in cast irons and in nickel-carbon and cobalt-carbon alloys.

4-81. **X-Ray Diffraction Studies of Chromium-Steel Slags.** G. P. Chatterjee and S. S. Sidhu. *Journal of Applied Physics,* v. 18, June 1947, p. 519-521.

Studies of the crystalline constituents in acid openhearth chromium steel samples showed that chromium exists in these samples as a chromium-iron spinel of the form $FeO \cdot Cr_2O_3$.

4-82. **Gases Causing Unsoundness in Copper-Base Alloys.** L. W. Eastwood and J. G. Kura. *Foundry,* v. 75, July 1947, p. 70-71, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218-220, 222-223.

The relative importance of various types of gas-metal reactions in copper-base alloys. (Third of a series of articles based on investigations sponsored by the Non-Ferrous Ingot Metal Institute.)

4-83. **Contributions to the Theory of Beta-Phase Alloys.** Clarence Zener. *Physical Review,* v. 71, June 15, 1947, p. 846-851.

Beta-phase alloys, of which beta brass is the prototype, exemplify the 3/2 electron-atom rule of Hume-Rothery, and also furnish examples of order-disorder phenomena. The origin of certain other characteristics common to these alloys, including the peculiar shape of their constitution diagram, the high elastic anisotropy, and the anomalous temperature coefficient of the elastic constants E_{110} and E_{100}. 15 ref.

4-84. **Recrystallization of Duplex Brass.** R. W. K. Honeycombe and W. Boas. *Nature,* v. 159, June 21, 1947, p. 847-848.

Experiments in which the deformation and subsequent recrystallization of brass containing both the alpha and the beta phases were studied.

4-85. **The Physics of Sheet Steel. (Continued.)** G. C. Richer. *Sheet Metal Industries,* v. 24, June 1947, p. 1147-1154, 1164.

Location and structural effects of lattice impurities; carbon in iron; elastic deformation; and Young's modulus. (To be continued.)

4-86. **Hardening of Metals by Internal Oxidation.** J. L. Meijering and M. J. Druyvesteyn. *Philips Research Reports,* v. 2, April 1947, p. 81-102.

Certain alloys of silver, copper, and nickel can be dispersion-hardened by diffusing oxygen into them. Too small an affinity leads to a coarser distribution of the oxide formed, because conglomeration must take place via the atoms, and dissociation occurs more frequently when the oxide is not very stable. Thermodynamic considerations of the reaction front are given. 10 ref.

4-87. **Diagrama de Transformacao do Ferro Fundido Cinzento. (Transformation Diagram of Gray Cast Iron.)** Fabio Decourt Homem de Melo. *Boletim da Associacao Brasileira de Metais,* v. 3, April 1947, p. 360-376.

The transformation through which gray cast iron passes while cooling in a mold is affected by the rate of cooling.

4-88. **Acos Grafiticos. (Graphitic Steels.)** Tomio Kitice. *Boletim da Associacao Brasileira de Metais,* v. 3, April 1947, p. 273-290.

A preliminary study of the stability of cementite, with comments on the nature of graphitization and the ef-

fects of various chemical compositions. Various graphitic steels, their sources, properties, and applications. 20 ref.

4-89. Stress Relaxation Across Grain Boundaries in Metals. T'ing-Sui Kê. *Physical Review*, v. 72, July 1, 1947, p. 41-46.

In order to elucidate further the concept of relaxation of shear stress across grain boundaries in metals, the temperature dependence of internal friction and rigidity modulus of 99.991% aluminum have been measured as a function of frequency of torsional vibration and as a function of grain size of the specimen.

4-90. Sur la Determination Roentgenographique de la Deformation des Monocristaux dans les Metaux Polycristallins. (X-Ray Determination of Deformation of Monocrystals in Polycrystalline Metals.) Adela Kochanovska. *Revue de Metallurgie*, v. 43, July-Aug. 1946, p. 192-196; discussion, p. 196-197.

Main object of this investigation was to show the possibility of determining changes in the shape of the elementary cells in polycrystalline metals. Characteristic magnitudes of such changes.

4-91. New Physico-Chemical Phenomena in the Deformation and Mechanical Treatment of Solids. P. Rehbinder. *Nature*, v. 159, June 28, 1947, p. 866-867.

Summarizes report on wartime advances in the U.S.S.R. presented at general meeting of the Academy of Sciences in July 1946. Of special interest are two effects resulting from the penetration of surface-active substances into microcracks, retarded elastic deformation in mica crystals, and structural changes on plastic deformation of metals.

4-92. Intercrystalline Cohesion and the Stress-Rupture Test. H. H. Bleakney. *American Society for Testing Materials Preprint 34*, 1947, 15 p.

Existing theories of intercrystalline cracking are stated, and criticized in the light of accumulated evidence. A hypothesis is suggested for certain phenomena and this hypothesis is used as a basis for planning a research problem. 33 ref.

4-93. La Structure des Surfaces Polies Mécaniquement et Electrolytiquement. (Structure of Mechanically Polished and Electropolished Surfaces.) H. Raether. *Métaux et Corrosion*, v. 22, Jan. 1947, p. 2-17.

Differences in the crystal structure of mechanically polished and electropolished surfaces are accentuated by use of electron diffraction or electron microscopy.

4-94. L'Existence de Phénomenes de Retard a la Solidification pour l'Aluminium Raffiné a 99.99% et son Application a la Préparation de Cristaux Uniques. (Existence of Solidification Delay Phenomena in 99.99% Pure Aluminum and Their Application in the Production of Single Crystals.) Paul LaCombe and Louis Beaujard. *Métaux et Corrosion*, v. 22, Jan. 1947, p. 18-19.

The existence of solidification delay or superfusion phenomena in 99.99% pure aluminum. Attempts to produce large aluminum crystals were completely successful. Method used.

4-95. The Recrystallization Properties of Aluminum-Magnesium Alloys and Their Effects on the Corrosion Characteristics. W. Bungardt and H. Rohde. *Headquarters Air Materiel Command, Wright Field, Translation F-TS-1878-RE*, May 1947, 4 p.

Results of metallographic analysis of the structure of Al-Mg alloys after recrystallization. Effects of cold and heat hardening methods, annealing temperature, and annealing time on grain size. (From report of *Deutsche Versuchsanstalt für Luftfahrt, E.V., Berlin-Adlershof*.)

4-96. Sur l'Etat d'Equilibre des Solutions Solides. (The State of Equilibrium of Solid Solutions.) Pierre Laurent. *Comptes Rendus*, v. 224, May 12, 1947, p. 1431-1433.

A theoretical study of the mechanism of precipitation in supersaturated solid solutions.

4-97. Sur la Structure de l'Eutectique des Fontes Grises. (Concerning the Eutectic Structure of Gray Irons.) Albert Portevin and Henri Laplanche. *Revue de Métallurgie*, May-June 1946, p. 129-131.

Graphitic eutectic formations in gray irons. Photomicrographs illustrate the various types of eutectics.

4-98. Remarques sur l'Essai Macrographique de l'Aluminium et de ses Alliages. (Remarks on Macrographic Tests on Aluminum and Its Alloys.) J. Hérenguel and F. Santini. *Revue de Métallurgie*, May-June 1946, p. 132-136.

Segregation in aluminum and its alloys.

4-99. The Effect of Changes in Condition of Carbides on Some Properties of Steel. J. B. Austin. *Transactions of American Society for Metals*, v. 38, 1947, p. 28-69.

Types of chemical bond and the structure of cementite; variation in carbon content; replacement of carbon and of iron by other elements; variation of composition during annealing or tempering; composition of carbide formed on isothermal transformation; effect of composition on properties of carbide and matrix; and effect of carbide composition on the properties of steel. 30 ref. (1946 Edward DeMille Campbell Memorial Lecture.)

4-100. A Low-Temperature Transformation in Lithium. Charles S. Barrett. *Physical Review,* v. 72, Aug. 1, 1947, p. 245.

An X-ray diffraction study of a transformation at −196° C., which is induced by plastic deformation. The transformation to the face-centered cubic form is accompanied by a series of audible clicks, as in the twinning of tin or magnesium, and by the formation of martensite. By analogy it may be concluded that the transformation goes by abrupt shear movement in small isolated regions.

4-101. Decarburization During Annealing of Malleable Iron. H. A. Schwartz and James Hedberg. *Transactions of American Society for Metals,* v. 39, 1947, p 61-70; discussion, p. 70-72.

A metallographic study of the structure of cast iron before and after annealing.

4-102. An X-Ray Study of the Effect of High Hydrostatic Pressures on the Perfection of Crystals. Louis Rosen. *Transactions of American Society for Metals,* v. 39, 1947, p. 713-722; discussion, p. 722-724.

Powdered sodium chloride and powdered aluminum were subjected to hydrostatic pressures of 12,300 atmospheres in oil for at least 1.7 hr. X-ray diffraction patterns were compared with unpressed material. The pressed specimens showed increased resolving power and a slightly smaller lattice parameter. The effect can be explained by assuming that the crystals of the original specimens contained imperfections whose dimensions were only a few atomic diameters and that the high hydrostatic pressures caused viscous flow which tended to fill in the "holes". 14 ref.

4-103. Transformations in Krupp-Type Carburizing Steels. A. R. Troiano and J. E. DeMoss. *Transactions of American Society for Metals,* v. 39, 1947, p. 788-798; discussion, p. 798-800.

The transformation characteristics of a low-carbon and high-carbon Krupp-type carburizing steel. Austenitizing temperatures approximate those of commercial practice. An X-ray diffraction method for obtaining A_{cm} in the high-carbon steel and also for determining the carbon content of austenite in the presence of undissolved carbides. The general transformation features in terms of the behavior of other alloy steels. 10 ref.

4-104. The Distribution of Microhardness Within a Single Metallic Grain. A. A. Bochvar and O. S. Zhadaeva. *Bulletin of the Academy of Sciences of U.S.S.R. (Section of Technical Sciences),* no. 4, 1947, p. 419-424. (In Russian.)

Microhardness tests on single grains of copper, brass, and aluminum. Random microhardness tests may show a wide spread of values within a single grain, but hardness values obtained along any particular crystallographic plane show very little spread.

4-105. On the Texture of Condensed Layers of Metals. M. M. Umanskii and S. T. Konobevskii. *Journal of Experimental & Theoretical Physics (U.S.S.R.),* v. 17, no. 5, 1947, p. 408-415. (In Russian.)

An orientation of crystallites varying from point to point has been found to exist and has been determined in thin layers of variable thickness. The relation between orientation and the direction of the molecular ray. A hypothetical mechanism of condensation.

4-106. Structure of Retained Austenite in Plain Carbon Steels. W. J. Wrazej. *Nature,* v. 160, July 19, 1947, p. 93.

Retained austenite in quenched plain carbon steels should be regarded as a face-centered tetragonally distorted structure and not face-centered cubic.

4-107. The Dimensional Stability of Steel. Part III. Decomposition of Martensite and Austenite at Room Temperature. B. L. Averbach, M. Cohen, and S. G. Fletcher. *American Society for Metals Preprint No. 8,* 1947. (To be published in *Transactions* for 1948.)

Decompositions were measured in a plain carbon toolsteel and a ball-bearing steel by observing dimensional changes during aging. Martensite contractions were simply additive. An equation has been fitted to the basic reaction curve in order to predict the dimensional behavior of martensite. Retained austenite decomposes isothermally at room temperature causing an increase in length. Tempering decomposes some austenite, but the reaction is not additive. Rolling direction had little effect but interrupting the hardening quench above room temperature markedly influenced the behavior of the retained austenite.

4-108. Acicular Transformations in Alloy Steel. Edward A. Loria. *American Society for Metals Preprint No. 9,* 1947, 16 p. (To be published in *Transactions* for 1948.)

Data of a fundamental nature on the acicular structure occurring within the intermediate isothermal transformation range of two alloy steels containing appreciable amounts of a number of carbide-forming elements.

4-109. The Location of Alloying Metals in White Cast Iron. H. A. Schwartz and James Hedberg. *American Society for Metals Preprint No. 13,* 1947, 8 p. (To be published in *Transactions* for 1948.)

An attempt to determine the dis-

tribution of metallic alloying elements in white cast iron between cementite and ferrite during freezing and cooling. Electrolytic methods were used to separate the two phases. The distributions of molybdenum, chromium, nickel, and manganese were studied. The results are believed to be of value for the study of the mechanism of retardation or acceleration of graphitization by certain elements.

4-110. Graphitization of Steel at Elevated Temperatures. A. B. Wilder and J. D. Tyson. *American Society for Metals Preprint No. 14,* 1947, 17 p. (To be published in *Transactions* for 1948.)

The stability of 93 different types of steel at 900, 1050 and 1200° F. is being evaluated over a period of 11 years. Welded samples are included to determine the susceptibility of the steels to graphitization. Results obtained in an examination of 38 steels for evidence of graphite formation after exposure for 10,000 hr. indicate that addition of molybdenum, phosphorus, nickel, and vanadium does not insure freedom from graphite formation.

4-111. Concept of the Hydrogen Potential in Steam-Metal Reactions. Carl A. Zapffe. *American Society for Metals Preprint No. 15.* (To be published in *Transactions* for 1948.)

Thermodynamic study of numerous reactions of metals and alloys with moisture. The hydrogen potentials provide a basis for calculating the liability of the various metal systems to hydrogen pickup, from the moisture reaction. Calculations for iron, steel, stainless steel, nickel, chromium, manganese, silicon, aluminum, and magnesium. Conditions over a wide range of temperature, and a wide range of humidity and steam pressure yield calculations which explain numerous metallurgical phenomena.

4-112. The Distribution of Oxygen and Nitrogen in an Alloy Steel Ingot. C. F. Sawyer, J. W. Spretnak, and G. Derge. *American Society for Metals Preprint No. 26,* 1947. (To be published in *Transactions* for 1948.)

The distribution in a 26-in.x26-in. ingot of S.A.E. 4335 steel was studied by means of the vacuum fusion method of analysis. Required sample size to determine the oxygen and nitrogen contents in a given position in the ingot with a given degree of precision.

4-113. Interatomic Distances in Crystals and the Hume-Rothery Formula. F. S. Sarkissov. *Comptes Rendus de l'Academie des Sciences de l'U.R.S.S.,* v. 55, no. 8, 1947, p. 727-730. (In English.)

Hume-Rothery's generalization that the interatomic distances in crystals vary according to a periodic law. While Hume-Rothery confines himself to elements in subgroup A, the author establishes mathematical relationships for subgroup B

4-114. An Investigation Into the Structure of the Nickel Skeleton Catalyst. G. G. Urazov, L. M. Kefely and S. L. Lelchuk. *Comptes Rendus de l'Academie des Sciences de l'U.R.S.S.,* v. 55, no. 8, 1947, p. 735-738. (In English.)

A study made to determine whether changes take place in the lattice when Al atoms are removed from Ni_2Al_3, or whether the voids remain in place. It was found that the remaining nickel atoms rearrange to form a side-centered nickel lattice.

4-115. Kinetics of Grain Growth of Austenite in Boron Steels. S. M. Vinarov. *Comptes Rendus de l'Academie des Sciences de l'U.R.S.S.,* v. 55, no. 9, 1947. p. 809-811. (In English.)

Experiments were run with homogenized bars forged from a series of steels containing from 0.35 to 0.37% C and from 0.001 to 0.1% B. The bars were heated under different conditions, and their austenite grain size determined by cementation and oxidation methods and evaluated on the A.S.T.M. scale. It is concluded that grain growth of austenite is arrested by the formation of a monoatomic layer of boron, which is surface-active towards gamma-iron and lowers the free energy of the grains.

4-116. The Mutual Solid Solubility of Tungsten Carbide and Titanium Carbide. A. G. Metcalfe. *Journal of the Institute of Metals,* v. 73, June 1947, p. 591-607.

Structure and lattice parameters of tungsten carbide and titanium carbide investigated by the X-ray powder diffraction method. From results obtained up to 2800° C., a tentative equilibrium diagram has been drawn for the WC-TiC section of the ternary system Ti-W-C. 18 ref.

4-117. The Constitution of the Aluminum-Rich Aluminum-Cobalt-Nickel Alloys. G. V. Raynor. *Journal of the Institute of Metals,* v. 73, June 1947, p. 609-623.

Micrographic, thermal, and X-ray methods used. The general features of the constitutional diagram, and particularly the nature and extent of the solubility of nickel in Co_2Al_9, agree with predictions made on the basis of previous work, experimental and theoretical, on aluminum-iron-nickel alloys 10 ref.

4-118. Sur les Equilibres du Système Plomb-Argent-Zinc au Voisinage de l'Eutectique Binaire, Riche en Plomb. (The Equilibrium of the Lead-Silver-Zinc System in the Vicinity of the Lead-Rich Binary Eutectic.) Leon Jollwet.

Comptes Rendus, v. 224, June 30, 1947, p. 1826-1827.

Desilvering of lead by zinc in the lead-silver-zinc system. Oxidation of zinc is a source of error which the author attempted to avoid.

4-119. Selenium Additions to Cast Steel; Influence on Sulphide Inclusions and Ductility. Albert P. Gagnebin. *American Foundryman*, v. 12, Aug. 1947, p. 43-52.

In addition to refining the grain, selenium has the specific ability to coalesce the intergranular sulphides in low-oxide, well-killed cast steel, and thereby to improve its ductility. A theory for the mechanism of this phenomenon.

4-120. Stabilization, Tempering, and Relaxation in the Austenite-Martensite Transformation. J. H. Hollomon, L. D. Jaffe, and D. C. Buffum. *Journal of Applied Physics*, v. 18, Aug. 1947, p. 780-781.

Stabilization in the austenite-martensite reaction does not arise from tempering of martensite, but from stress relaxation. Apparently, the relaxation centers responsible for stabilization are produced by local plastic flow caused by austenite-martensite transformation and perhaps by nonuniform thermal contraction.

4-121. Hydrogen in Steel. J. H. Andrew, H. Lee, H. K. Lloyd, and N. Stephenson. *Iron and Steel*, v. 20, Aug. 1947, p. 397; discussion, p. 405.

A comprehensive study of the evolution of hydrogen from 22 different steels, hydrogen-soaked and cooled in vacuum under identical conditions.

4-122. Hydrogen in Steel Manufacture. C. Sykes, H. H. Burton, and C. C. Gegg. *Iron and Steel*, v. 20, Aug. 1947, p. 394-395; discussion, p. 405.

Determinations of the hydrogen content of plain carbon and alloy steels at different stages of manufacture indicate that ductility is reduced with hydrogen contents in excess of 2 cc. per 100 g. Even when steel is melted under carefully controlled conditions, hydrogen contents of 4 to 6 cc. per 100 g. are to be expected. Relatively high hydrogen contents do not automatically lead to hairline cracks. Data on permeability and solubility are used to calculate values for the diffusivity of hydrogen, making possible the prediction of the rate of loss of hydrogen from steels at temperatures down to 400° C., at relatively high hydrogen concentrations.

4-123. The Iron-Nitrogen System at High Pressures. I. R. Krichevskii and N. E. Khazanova. *Journal of Physical Chemistry (U.S.S.R.)*, v. 21, June 1947, p. 719-733. (In Russian.)

An investigation of this system from 350 to 525° C. and at pressures of 750 to 3770 atmospheres. The solubility of molecular nitrogen in iron is strongly influenced by pressure. At 750 atm. the solubility was only 0.04%; at 2300 atm. it increased to 0.33%. Preliminary oxidation of the surface of the specimen accelerated the penetration of nitrogen. 27 ref.

4-124. The Intermetallic Compound Phases of the System Aluminum-Manganese-Zinc. G. V. Raynor and D. W. Wakeman. *Proceedings of the Royal Society (Series A)*, v. 190, June 17, 1947, p. 82-101.

The system Al-Mn-Zn was examined in the range 0 to 95% Zn and 0 to 3% Mn. Phase diagrams and photographs of crystals. 12 ref.

4-125. X-Ray Reflections From Dilute Solid Solutions. K. Huang. *Proceedings of the Royal Society (Series A)*, v. 190, June 17, 1947, p. 102-117.

The effect on X-ray reflection of deviations of atoms from ideal lattice sites caused by the presence of randomly distributed foreign atoms in a dilute solid solution was investigated quantitatively. The theoretical formulas are applied to solid solutions of gold and copper.

4-126. Residual Stresses Caused by Grinding. L. A. Glikman and V. A. Stepanov. *Engineers' Digest (American Edition)*, v. 4, Aug. 1947, p. 378-379.

If the surface layer of the material is heated above the critical temperature then phase changes are bound to occur which may be responsible for the occurrence of additional residual surface stresses. Grinding tests on hardened steel pieces with preponderantly martensitic structure show that such phase changes may take place despite the short duration of the heating effect, but in steel specimens with sorbitic or pearlitic structure, no such transformation could be verified by experiment. (Translated and condensed from *Journal of Technical Physics*, v. 16, no. 7, 1946, p. 791-802.)

4-127. Graphite Formation in Gray Cast Iron. H. Morrogh and W. J. Williams. *Engineering*, v. 164, Aug. 8, 1947, p. 141-143; Aug. 15, 1947, p. 166-168.

An extensive and critical discussion of theories and experimental data available from the literature. Experimental results obtained by the authors. (Condensed from paper presented before Institute of British Foundrymen, Nottingham, England, June 17-20, 1947.)

4-128. Sheet Copper; Persistence of the Primary Solidification Structure. P. A. Jacquet. *Metal Industry*, v. 71, Aug. 22, 1947, p. 146-148.

Investigations of certain types of copper ingots characterized by very

large crystals obtained by melting in vacuo and having a dendritic structure. 10 ref. (Translated and abstracted from *Métaux-Corrosion-Usure.*)

4-129. Proposed Experiments for Further Study of the Mechanism of Plastic Deformation. J. S. Koehler and F. Seitz. *Journal of Applied Mechanics,* v. 14 (*Transactions of the A.S.M.E.,* v. 69), Sept. 1947, p. A217-A224.

A qualitatively satisfactory theory is discussed and is then used to suggest worth-while experiments using single crystals in an attempt to simplify their interpretation. 28 ref.

4-130. Derivation of Stress, Strain, Temperature, Strain-Rate Relation for Plastic Deformation. J. D. Lubahn. *Journal of Applied Mechanics,* v. 14 (*Transactions of the A.S.M.E.,* v. 69), Sept. 1947, p. A229-A230.

The derivation and correction of an equation previously presented by J. H. Hollomon and the author.

4-131. Phosphorus-Deoxidized Copper Containing Bismuth. T. H. Schofield and F. W. Cuckow. *Engineering,* v. 164, Aug. 22, 1947, p. 190-191.

Previous investigations have shown that cold rolled nonarsenical phosphorus-deoxidized copper containing small quantities of bismuth is brittle at room temperature after quenching from 550°, but ductile after quenching from 750° C. The cause of this brittleness has not been established, but it is inferred that it may be due to intercrystalline films. Results of an electron microscope investigation to confirm the presence or absence of the films are somewhat inconclusive. (Condensed from "The Microstructure of Wrought Nonarsenical Phosphorus-Deoxidized Copper Containing Small Quantities of Bismuth," presented to Institute of Metals, London, May 22, 1947.)

4-132. X-Ray Diffraction Studies of Yielding in Mild Steel. E. W. Fell. *Nature,* v. 160, Aug. 23, 1947, p. 259.

Correlation between results reported by the author in 1927 and 1937 and those reported by Cowley and Paterson in a recent issue (v. 159, 1947, p. 846).

4-133. Residual Lattice Strains in Plastically Deformed Metals. G. B. Greenough. *Nature,* v. 160, Aug. 23, 1947, p. 258.

Experimental work shows that internal stresses arise mainly from plastic anisotropy of the metal and that the tensile stress required to cause glide in a given grain depends on the orientation of the glide planes and glide directions.

4-134. Reaction Between Molten Iron and Hydrogen Sulphide. *Journal of the Iron and Steel Institute,* v. 156, Aug. 1947, p. 528-530.

R. V. Riley discusses paper by James White and H. Skelly (Feb. issue), concerning a gray deposit resulting from the above reaction in silica combustion tubes. The authors' reply discusses at some length the theory that the material is SiS_2 formed by reaction of silica and sulphur.

4-135. As-Cast and Aged Structures of Cr-Co Alloys. *Metal Progress,* v. 52, Sept. 1947, p. 400B.

A series of 20 photomicrographs, covering four different aging times of five different alloys.

4-136. Graphitization of Steels at Elevated Temperatures. Albert E. White. *Metal Progress,* v. 52, Sept. 1947, p. 371-375.

A tendency for carbide to graphitize in steel pipe and fittings in high-pressure steam systems, discovered in 1943, has been combatted by specifying coarse-grained structure in the pipe—which prevents the steelmaker from deoxidizing the melt with aluminum, the greatest single promoter of instability of carbide—and by adding chromium to pipe, castings, and forged fittings for promoting stability of carbides.

4-137. Hexagonal Slip in Beryllium Crystal. Lester Tarnopol. *Metal Progress,* v. 52, Sept. 1947, p. 391.

Slip planes forming an excellent hexagon about a Brinell indentation in a beryllium single crystal.

4-138. Total Cross Section of Aluminum for Fast Neutrons. L. W. Seagondollar and H. H. Barschall. *Physical Review,* v. 72, Sept. 15, 1947, p. 439-444.

Results of measurement of the total neutron cross section of aluminum as a function of neutron energy in the range from 10 to 1000 kev.

4-139. Le Role des Joints Intergranulaires dans la Déformation des Métaux. Application au Fluage et a la Fatigue. (The Role of Intergranular Seams in the Deformation of Metals. Application to Creep and Fatigue.) Ch. Crussard. *Revue de Métallurgie,* v. 43, Nov-Dec. 1946, p. 307, 317.

Investigation of the deformation of metals having hexagonal and cubic crystals. 18 ref.

4-140. Fatigue et Effet Bauschinger. (Fatigue and the Bauschinger Effect.) Pierre Laurent and Michel Ferry. *Revue de Métallurgie,* v. 43, Nov-Dec. 1946, p. 327-329.

Tests of plasticity of individual crystals and mathematical data on various types of deformation. The Bauschinger effect permits study of consolidated stresses.

4-141. Grain Boundaries in Metals. *Engineer,* v. 184, Aug. 29, 1947, p. 196-197.

Discusses and reviews six papers on the above subject, from Rosenhain and Erven's 1912 presentation to Ting-Sui Ke's recent article in *Physical Review.*

4-142. Diffraction of X-Rays by the Alloy $AuCu_3$. *Nature,* v. 160, Aug. 30, 1947, p. 403.

I. G. Edmunds, R. M. Hinde, and H. Lipson present results obtained by taking X-ray oscillation photographs of a single crystal, and discuss them in terms of published theories. A. J. C. Wilson develops a mathematical expression which accounts qualitatively for the results presented by Edmunds, Hinde, and Wilson, and also for those of other investigators.

4-143. The Adsorption of Hydrogen on Tungsten Powders. George Halsey and Hugh S. Taylor. *Journal of Chemical Physics,* v. 15, Sept. 1947, p. 624-630.

An analysis of the data of Frankenburg on the adsorption of hydrogen by metallic tungsten powder between −194° and 750° C. It was possible to interpret the data only on the basis of a nonuniform surface without interaction.

4-144. Etat Actuel de Nos Connaissances sur les Points Durs Dans Les Alliages Légers. Aspects, Composition, Causes. (Present Status of Knowledge of Hard Spots in Light Alloys. Aspects, Compositions, Causes.) Marcel Bardot. *Fonderie,* June 18, 1947, p. 684-691.

A summary based on literature in English and German. Concludes that most hard spots are due to the formation of corundum or spinel.

4-145. Modifications of Aluminum-Germanium Alloys. E. A. Boom. *Bulletin of the Academy of Sciences of the U.S.S.R., Section of Chemical Sciences,* May-June 1947, p. 317-318. (In Russian.)

The effect of additions of sodium on the structure of Al-Ge alloys. Results are comparable to the effects observed in Al-Si alloys.

4-146. Dependence of Structural Degree of Order of Cu-Au Alloys on Temperature and Concentration. A. Komar and N. Buinov. *Journal of Experimental and Theoretical Physics,* v. 17, June 1947, p. 555-563. (In Russian.)

A relationship is established connecting the relative intensity of the lines in Debye patterns with the "degree of order" of the atomic structure as described by Bragg and Williams, for gold-copper alloys containing 18.9 to 33.9 atomic percent gold. The data indicate better agreement with the theory of Peirls than with that of Bragg and Williams. 20 ref.

4-147. The Effect of Cobalt on the Rate of Nucleation and the Rate of Growth of Pearlite. Malcolm F. Hawkes and Robert F. Mehl. *Metals Technology,* v. 14, Aug. 1947, T.P. 2211, 26 p.

Results of experiments show that cobalt increases both of the above processes and that this effect is inherent in the Fe-Co-C system and not dependent upon factors relating to austenite heterogeneity nor upon any recognizable adventitious factor. Other factors covered include: effect of cobalt on hardenability; effect of cobalt on coefficient of diffusion of carbon in austenite; rate of diffusion of cobalt in austenite; effect of nitrogen on the rate of transformation of cobalt steels; and effect of cobalt on the martensite temperature range. 34 ref. (Presented at New York Meeting of A.I.M.E., March 1947.)

4-148. The Diffusion Rates for Carbon in Austenite. F. E. Harris. *Metals Technology,* v. 14, Aug. 1947, T.P. 2216, 22 p.

The steady state and unsteady flow under definite restrictions. Beginning with the fundamental concept, the development is continued until equations are obtained. Results are then compared with experimental data Rigorous proof is not claimed. Instead an attempt is made to set forth the physical significance of the diffusion mechanism, and particularly to express the factors which influence the flow of carbon in austenite. Also indicates that gaseous media may be used with reasonable accuracy in making the determinations. (Presented at New York Meeting of A.I.M.E., March 1947.)

4-149. Graphite Formation in Gray Cast Iron. H. Morrogh and W. J. Williams. *Foundry Trade Journal,* v. 82, Aug. 21, 1947, p. 359-363; Aug. 28, 1947, p. 391-396; Sept. 4, 1947, p. 6-12.

See abstract of condensation which appeared in *Engineering,* Aug. 8 and Aug. 15, 1947. (Item 4-127.)

4-150. An X-Ray Diffraction Study of the Silver-Magnesium Alloy System. Harold R. Letner and S. S. Sidhu. *Journal of Applied Physics,* v. 18, Sept. 1947, p. 833-837.

Investigation by X-ray photograms showed four homogeneous solid solutions in the Ag-Mg system. 18 ref.

4-151. Andrade's Creep Law and the Flow of Zinc Crystals. A. H. Cottrell and V. Ayterkin. *Nature,* v. 160, Sept. 6, 1947, p. 328-329.

Several modifications have been made in Andrade's law in order to extend the results to single crystals. Zinc crystals, in the form of wires, were examined and results calculated.

4-152. A Dynamical Model of a Crystal Structure. Lawrence Bragg and J. F. Nye. *Proceedings of the Royal Society*

(Series A), v. 190, Sept. 9, 1947, p. 474-481.

The crystal structure of a metal is represented by an assemblage of bubbles floating on the surface of a soap solution. The assemblages show structures which have been supposed to exist in metals, and simulate effects which have been observed, such as grain boundaries, dislocations and other types of fault, slip, recrystallization, annealing, and strains due to foreign atoms.

4-153. Grain Boundaries. *Metal Industry*, v. 71, Sept. 19, 1947, p. 246.

Three recent papers on the amorphous-phase theory.

4-154. Effect of Heat Treating and Cold Rolling on Crystal Structure of Austenitic Manganese Steel. N. P. Goss. *Steel*, v. 121, Sept. 29, 1947, p. 74-75, 117-118, 120; Oct. 6, 1947, p. 98-100, 132, 135, 138, 141-143.

The X-ray diffraction method for following alterations in grain structure beyond the microscope's range. The mosaic theory of subboundary structure is used to explain changes taking place in heat treated Hadfield steels. Results reported in final part indicate that delayed quenching may actually improve the capacity for plastic deformation by cold working.

4-155. Quelques Remarques Pratiques Sur Les Gaz Dans L'Acier et la Fonte. (Some Practical Remarks on Gases in Steel and Cast Iron.) Eugène Eyt. *Fonderie*, July 1947, p. 713-720.

Factors which cause gas absorption in steel and cast iron, emphasizing viscosity and surface tension of the metal. A hypothesis for the stabilization of gases by precipitation of oxides formed during deoxidation.

4-156. Determination of the Crystal Structure of Gold Leaf by Electron Diffraction. T. B. Rymer and C. C. Butler. *Proceedings of the Physical Society*, v. 59, July 1, 1947, p. 541-554.

Radii of the rings of Debye-Scherrer electron-diffraction photographs obtained from gold leaf are not in exact agreement with theoretical values. This is ascribed to distortion of the crystal lattice by surface-tension forces.

4-157. The Hole Theory of Diffusion. G. Wyllie. *Proceedings of the Physical Society*, v. 59, July 1, 1947, p. 694-699.

A mechanism for diffusion in a dilute substitutional solid solution of one metal in another explains cases where diffusion of a foreign metal atom in a lattice has a lower activation energy than self-diffusion in the same lattice, gold in lead being a conspicuous example.

4-158. The Isothermal Transformation of a Eutectoid Aluminum Bronze. David J. Mack. *Metals Technology*, v. 14, Sept. 1947, T.P. 2242, 16 p.

The material used was a high-purity aluminum bronze containing 88.07% Cu, 11.89% Al, 0.02% Fe and 0.01% Mn. 34 ref.

4-159. Some Observations of Lineage in Copper Crystals. Walter R. Hibbard, Jr. *Metals Technology*, v. 14, Sept. 1947, T.P. 2244, 6 p.

Lineage denotes dendritic branches, grown from a crystal nucleus during solidification from the liquid, with imperfections in alignment of the order of 10^{-1} to 10^{-4} cm. Results of metallographic, X-ray, and property studies of lineage in large grain and single crystal specimens of copper. 15 ref.

4-160. Grain Growth in High-Purity Aluminum and in an Aluminum-Magnesium Alloy. Paul A. Beck, L. J. Demer, Joseph C. Kremer, and M. L. Holzworth. *Metals Technology*, v. 14, Sept. 1947, T.P. 2280, 23 p.

Results of an investigation of isothermal grain growth in rolled strips of high-purity aluminum and of a high-purity Al alloy containing 2.1% Mg, at a series of temperatures. Effects of annealing time and temperature, different amounts of cold work, and of the Mg addition. 13 ref.

4-161. Austenite Transformation Above and Within the Martensite Range. Robert T. Howard, Jr., and Morris Cohen. *Metals Technology*, v. 14, Sept. 1947, T.P. 2283, 13 p.

The purpose of this paper is to direct attention to the lower part of the austenite transformation diagram where considerable uncertainty still exists as to the blending of the bainite and martensite reactions. The transformation was studied quantitatively by lineal analysis in a series of five high-carbon and nickel steels. A single empirical equation has been fitted to the five curves. 15 ref.

4-162. The Alloys of Magnesium and Cobalt. E. M. Cramer, H. P. Nielsen, and F. W. Schonfeld. *Light Metal Age*, v. 6, Sept. 1947, p. 6-9.

Results of experimental work on the low-cobalt portion of the phase diagram, obtained by thermal, microscopic, X-ray, and physical-examination methods.

4-163. Growth of Stimulated Crystals and Rate of Nucleation During Recrystallization of Aluminum. W. G. Burgers. *Nature*, v. 160, Sept. 20, 1947, p. 398-399.

Dependence of the above quantities on the time of recrystallization at constant temperature.

4-164. The Role of the Constituents of Coke in Graphite Formation. V. N. Krylov. *Journal of Applied Chemistry (U.S.S.R.)*, v. 20, no. 3, 1947, p. 239-244. (In Russian.)

Results of a study of the effect of the metallic constituents of coke on the structure and properties of graphite electrodes produced from it. Elimination of iron is necessary because it has a high boiling point and therefore remains in the graphite and forms alloys with aluminum and silicon. This hinders the electrochemical separation of the latter.

4-165. Reactions in the System SiO_2-C at Elevated Temperatures. A. N. Novikov. *Journal of Applied Chemistry (U.S.S.R.)*, v. 20, May 1947, p. 431-438. (In Russian.)

The mechanism of the above reactions and the probability of their occurrence at different temperatures. 11 ref.

4-166. The Motion of an Electron in the Lattice of an Alloy of Arbitrary Composition. A. A. Smirnov. *Journal of Experimental and Theoretical Physics (U.S.S.R.)*, v. 17, Aug. 1947, p. 730-742. (In Russian.)

Attacks the above problem after considering electron behavior in the lattice of a fully ordered alloy from the point of view of quantum mechanics. Determines the influence of composition and of long-range order on the energy spectrum of the electron.

4-167. Theory of Electroconductivity of Ordered Alloys. A. A. Smirnov. *Journal of Experimental and Theoretical Physics (U.S.S.R.)*, v. 17, Aug. 1947, p. 743-752. (In Russian.)

How electrical conductivity of an alloy is influenced by composition and by long-range order in the distribution of atoms. Experimental data with the resulting formula for residual electrical conductivity in ordered binary alloys. 12 ref.

4-168. Long-Range Order in Au-Cu Alloys and Their Electroconductivity. A. P. Komar. *Journal of Experimental and Theoretical Physics (U.S.S.R.)*, v. 17, Aug. 1947, p. 753-756. (In Russian.)

An experimental relationship between the specific electrical resistance of alloys of approximate composition $AuCu_3$ and AuCu, and the degree of long-range order of the atoms. This relation agrees well with the quantum-mechanical theory of Smirnov-Ryzhanov, but the corresponding theory of Muto is not confirmed by experiment. 17 ref.

4-169. On the Equilibrium and Kinetics of Order-Disorder Transformations in Alloys. G. Borelius. *Journal of the Institute of Metals*, v. 74, Sept. 1947, p. 17-31.

The above equilibrium as a first approximation, by formulas giving the structural parts of internal energy and entropy as functions of a suitable measure of the degree of disorder. As a second approximation, the influence of fluctuations is taken into account. The calculations are compared with experimental results of measurements on CuZn. The kinetics of the transformations are described in a range on both sides of the critical point, the rate of transformation is influenced by a thermodynamic potential barrier which is theoretically described on the basis of the fluctuation theory, and the calculations are compared with results of X-ray measurements on AuCu. 18 ref.

4-170. The Constitution of Alloys of Aluminum With Copper and Manganese. M. K. B. Day and H. W. L. Phillips. *Journal of the Institute of Metals*, v 74, Sept. 1947, p. 33-54.

The constitution of alloys of Al-Cu-Mn, slowly cooled, was studied in detail by thermal and microscopic methods over the range 0 to 18% Cu and 0 to 8% Mn. 33 ref.

4-171. Behavior of a Chromium Steel in the Jominy Hardenability Test. W. I. Pumphrey. *Journal of the Iron and Steel Institute*, v. 157, Sept. 1947, p. 27-30.

Metallurgical examination, including examination by the electron microscope of the structures developed along the length of a Jominy bar of a steel possessing unusual hardenability characteristics at certain slow rates of cooling indicates that the structures can be explained on the basis of a derived S-curve which is not abnormal in type.

4-172. A Micro-Examination of Eight Steels for the Inclusions Sub-Committee. J. H. Whiteley. *Journal of the Iron and Steel Institute*, v. 157, Sept. 1947, p. 89-97.

An investigation of the number, distribution and nature of inclusions in a series of eight low-alloy steels. Full details of the counting procedure. Results indicate a direct relationship between the number of inclusions and combined sulphur and oxygen contents. Microstructures.

4-173. Unsolved Problems of Structural Chemistry. Linus Pauling. *Chemical and Engineering News*, v. 25, Oct. 13, 1947, p. 2970-2973, 3045.

In surveying the progress of the past 25 years it sometimes appears that the major problems in structural chemistry have been solved. Despite this, author points out a large number of unsolved problems in diverse

fields, including that of the structure of metals and intermetallic compounds. 12 ref.

4-174. Study of a High Speed Steel Ingot. Charles F. Sawyer, Jr. *Iron Age,* v. 160, Oct. 16, 1947, p. 140-142.

Results of a structural analysis, conducted by the technique of ingot splitting, coupled with chemical analysis which reveals some interesting ingot characteristics. Data of a quantitative nature relating to alloy segregation in a normal production ingot of 18-4-1 high speed steel.

4-175. The Structure of Sintered Hard Metals; Particularly Tungsten Carbide-Titanium Carbide-Cobalt Alloys. R. Kieffer. *Powder Metallurgy Bulletin,* v. 2, Oct. 1947, p. 104-111.

A new metallographic method for the investigation of cemented carbides. The procedure essentially consists in first producing recrystallization, thus causing pronounced grain growth of the carbide phase, and then applying a special selective-etching treatment which permits identification of the different carbide phases. Metallographic results confirm and supplement X-ray diffraction data on the mutual solid solubility of carbide systems. (Translated from *Zeitschrift für Metallkunde,* no. 9, 1944.)

4-176. Crystalline Aggregation of Cobalt Powder. J. T. McCartney and R. B. Anderson. *Journal of Applied Physics,* v. 18, Oct. 1947, p. 902-903.

In electron microscopic studies of Fischer-Tropsch catalysts, an interesting phenomenon was observed in cobalt metal powder reduced from cobaltous oxide. The oxide particles sintered into larger smooth droplets of cobalt that were aggregated into thin hexagonal-shaped platelets. X-ray diffraction analysis showed the presence of the hexagonal crystal phase of cobalt.

4-177. Manganese Bronze; Conditions Influencing Segregation. George E. Dalbey. *American Foundryman,* v. 12, Oct. 1947, p. 35-39; discussion, p. 39-42.

Under some conditions, manganese bronze melts were found to contain a sludge consisting of iron, silicon, aluminum, and manganese. Formation of the sludge is shown to be associated with silicon contents in excess of 0.1%. There is a tendency for elongation to decrease as silicon increases. The sludge will cause misruns in thin-walled castings. Discussion by George P. Halliwell who believes that segregation of hard spots in manganese bronze is not characteristic of that alloy, but is the result of faulty metallurgical practice. (Presented at 51st Annual Meeting, American Foundrymen's Association, Detroit, April 28-May 1, 1947.)

4-178. Hydrogen Embrittlement of Steel. Part I. *Metal Industry,* v. 71, Oct. 3, 1947, p. 288.

Reviews 1940 papers by C. A. Zapffe and C. E. Sims of Battelle Memorial Institute.

4-179. Hydrogen Embrittlement of Steel. Part II. *Metal Industry,* v. 71, Oct. 17, 1947, p. 325, 329.

Concludes discussion of recent work, principally by Zapffe and Sims. Occlusion of hydrogen; high-pressure tests; restoration of ductility. 3 ref.

4-180. Kinetics of the Solution of Nitrogen in Molten Iron and in Its Alloys With Silicon. M. M. Karnaukhov. *Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences,* June 1947, p. 735-747. (In Russian.)

Laboratory setup by which the speed of absorption and ultimate solubility of gases in molten metals can be measured with considerable accuracy. Such measurements made for the above resulted in a direct relationship between solubility and the square root of the pressure. Presence of SiN in Si-Fe alloys is demonstrated. 14 ref.

4-181. Investigation of Carbides in High-Alloy Toolsteels. V. I. Arkharov, I. S. Kvater, and S. T. Kiselev. *Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences,* June 1947, p. 749-756. (In Russian.)

A method of studying these carbides by electrolytic removal of the uncombined iron in forged, annealed specimens of varying composition. The residue was chemically analyzed, and lattice parameters were measured by the Debye method for the carbides present (Fe_3W_3C, VC, $Cr_{23}C_6$, and W_2C). The formation and characteristics of these carbides.

4-182. The Influence of Manganese on Polymorphic Transition in Alloys of Iron With Chromium. A. T. Grigor'ev and D. L. Kudriavtsev. *Bulletin of Academy of Sciences of the U.S.S.R., Section of Chemical Sciences,* July-Aug. 1947, p. 321-336. (In Russian.)

Two cross sections of the Fe-Cr-Mn ternary system with constant Mn contents of 0.6 and 1.4% and with different Cr contents up to 22% were studied by dilatometric analysis, hardness testing, and determination of specific electroconductivities and microstructures. The alpha-gamma and reverse transitions and the areas of these phases are revealed by the experimental work. 20 ref.

4-183. Classification of the Solubilities of the Elements in Iron. Part II. Continuous Solid Solutions of Iron. I. I. Kornilov. *Bulletin of Academy of Sciences of the U.S.S.R., Section of Chemical Sciences,* July-Aug. 1947, p. 337-344; discussion, p. 344-346. (In Russian.)

Continuous solid solutions of iron are classified on the basis of the relationships between atomic diameters. Possibility of the formation of ternary and more complex iron solutions, having crystal lattices of the same type and differences in atomic diameters of not more than 8%. Solid solutions of the ferrite class, and more complex than the ternary, cannot exist; how to calculate the number of ternary or more complex solutions of the austenite class. 20 ref.

4-184. The Shape of Heat-Capacity and Equilibrium Cooling Curves in the Region of Melting of Solid Solutions. Karol J. Mysels. *Journal of Physical & Colloid Chemistry,* v. 51, Nov. 1947, p. 1361-1369.

The heat-capacity and equilibrium cooling curve of a two-component system forming a solid solution. Its shape in the melting region is calculated completely from properties of the system measurable outside of this region. Conditions for the absence of a discontinuity or change of slope at the solid and liquid boundary; simplified idealized cases.

4-185. The Structure of Al-Zn Alloys and Structural Analogies in Other Alloy Systems. D. A. Petrov and T. A. Badaeva. *Journal of Physical Chemistry (U.S.S.R.),* v. 21, July 1947, p. 785-797. (In Russian.)

Results appear to disprove the formation of an intermediate phase at 443° C. and indicate that the observed thermal effects are due to a continuous change from a "disordered" solid solution to an "ordered" structure as the concentration is changed. It is believed that similar transitions take place in other alloy systems, such as Fe-Si, Au-Mn, and Ti-Bi. 18 ref.

4-186. X-Ray Investigation of Gold-Cadmium Alloys Rich in Gold. Anders Bystrom and Karl Erik Almin. *Acta Chemica Scandinavica,* v. 1, 1947, p. 76-89. (In English.) 11 ref.

4-187. Transformation in Eutectoid Alloys of Copper-Tin. Part VI. Structure and Orientation of the β-Phase. I. V. Isaichev. *Journal of Technical Physics (U.S.S.R.),* v. 17, July 1947, p. 829-834. (In Russian.)

Results of a study using the method of X-ray polar projection.

4-188. Orientation of Cementite in Annealed Carbon Steel. I. V. Isaichev. *Journal of Technical Physics (U.S.S.R.),* v. 17, July 1947, p. 835-838. (In Russian.)

Results of a study using the X-ray polar projection method.

4-189. X-Ray Analysis in the Steel Industry. *Journal of Scientific Instruments,* v. 24, Oct. 1947, p. 266-273.

Proceedings of a meeting of the X-Ray Analysis Group of the Institute of Physics—Sheffield, Nov. 8-9, 1946. Subjects were: Intensity relations of Debye-Scherrer powder diffraction lines, by A. J. Bradley. Application of X-rays to the study of internal stresses and deformation in metals, by W. A. Wood. An X-ray diffraction investigation of electrodeposited chromium, by H. J. Goldschmidt. Some successes and failures in the application of X-rays to industrial problems, by A. H. Jay. The surface structure of metals, by G. I. Finch. Includes discussion. 26 ref.

4-190. Ueber Die Systeme Cer-Nickel, Lanthan-Nickel, Praseodym-Nickel und Cer-Kobalt. (The Cerium-Nickel, Lanthanum-Nickel, Praseodymium-Nickel, and Cerium-Cobalt Systems.) Rudolf Vogel. *Metallforschung,* v. 2, April 1947, p. 97-103.

Experimentally obtained equilibrium diagrams for the above systems. The lattice constants of $LaNi_2$ and $PrNi_2$ were determined.

4-191. Die Löslichkeit des Kadmiums in Festem Kupfer. (The Solubility of Cadmium in Solid Copper.) Ernst Raub *Metallforschung,* v. 2, April 1947, p. 119-120.

The saturation curve of the alpha base of the Cu-Cd system follows a reverse course. The highest solubility is at 650°, about 100° above the eutectic point. Below the eutectic temperature, the solubility of Cd in Cu follows the course outlined by Owen and Pickup.

4-192. Das System Aluminium-Indium. (Aluminum-Indium System.) Siegfried Valentiner and Irmgard Puzicha. *Metallforschung,* v. 2, April 1947, p. 127-128.

In the liquid phase aluminum and indium form a marked miscibility gap from 3.5 to 90 atomic per cent of indium (13 to 98% by weight). The solubility of indium in aluminum and vice versa is very slight in the solid phase.

4-193. Recherches Quantitatives sur les Deplacements et les Déformations de Particules au Sein d'un Métal Laminé. (Quantitative Investigations of Displacements and Deformations of Internal Particles in Laminated Metal.) Raymond Jacquesson and Pierre Brousse. *Métaux et Corrosion,* v. 22, June 1947, p. 91-99.

Results of investigation of the above phenomena, for example under alternating torsion stress. On the basis of the hypothesis proposed for the internal microstructure of laminated metals, theoretical values of deformation and displacement are given which correspond quite closely with experimental data.

4-194. The Breadths of X-Ray Diffraction Lines From Martensite. J. A. Wheeler and M. A. Jaswon. *Journal of the Iron and Steel Institute,* v. 157, Oct. 1947, p. 161-166.

Results of a study of the variation with Bragg angle of the above line breadths using the Jones method of correction for instrumental broadening indicate that the line broadening is due to balanced internal stresses rather than to small particles. 12 ref.

4-195. Hydrogen Embrittlement of Steel. Part III. *Metal Industry,* v. 71, Oct. 31, 1947, p. 366.

Discussion of the literature on this problem.

4-196. Grain Growth in Alpha-Brass. J. E. Burke. *Journal of Applied Physics,* v. 18, Nov. 1947, p. 1028-1029.

A series of isothermal curves plotted from recently published data. An expression including a heat of activation for the process is derived. Calculations presented by Beck, Kremer, and Demer are criticized (see item 4-57).

4-197. Electron Microscope and Electron-Diffraction Study of Slip in Metal Crystals. R. D. Heidenreich and W. Shockley. *Journal of Applied Physics,* v. 18, Nov. 1947, p. 1029-1031.

A study of the structure of slip bands using 99.99% aluminum cast in the form of small single crystals.

4-198. Effects of Germination in C-Alloy Magnesium Castings. John McCabe and W. H. Sharp. *Metal Progress,* v. 52, Nov. 1947, p. 806-809.

During lathe cutting of the faces of some C-alloy sand castings, the metal chipped or tore rather severely. Metallographic examination showed that grain growth or "germination" had occurred. Factors responsible for this phenomenon. Shot-peening, solution heat treatment, and aging restored fatigue properties to normal.

4-199. Striations: Metallographic Evidence of Slip. D. McLean. *Journal of the Institute of Metals,* v. 74, Oct. 1947, p. 95-100.

Regular criss-cross striations were observed under the microscope in lightly deformed brass on sections electrolytically polished and suitably etched. The striations are sections through glide planes that have slipped, and probably indicate nonuniform deformation on these planes.

4-200. Superconductivity and Structure of Hydrides and Nitrides of Tantalum and Columbium. F. Hubbard Horn and Waldemar T. Ziegler. *Journal of the American Chemical Society,* v. 69, Nov. 1947, p. 2762-2769.

A survey of published data indicates that in a series of interstitial alloys containing the same parent metal, the superconducting transition temperature varies inversely with the dimension of the lattice parameters, provided the same crystal structure is maintained. Structures of the systems H_2-Ta, H_2-Cb, and of tantalum nitride and columbium nitride were investigated by X-ray diffraction.

4-201. The Structure of Tempered Martensite. W. J. Wrazej. *Canadian Metals & Metallurgical Industries,* v. 10, Nov. 1947, p. 17-22.

X-ray examination of quenched samples tempered at 100° C. for 24 hr. showed that martensite changes on tempering into ferrite and cementite. 11 ref.

4-202. A New Structural Diagram for Cast Iron. H. Laplanche. *Metal Progress,* v. 52, Dec. 1947, p. 991-992, 992B, 993.

Maurer's structural diagram was admitted by its originator to apply only to a single size test piece and cooling rate. The original text is quoted to show that the diagram was based on assumptions rather than information. A new structural diagram relates silicon, carbon, and cooling rate to the resulting microstructure.

4-203. Physical Properties and Crystal Structure of Polonium. W. H. Beamer and C. R. Maxwell. *U. S. Atomic Energy Commission MDDC 721; LADC 284,* Aug. 30, 1946, 38 p.

This element is very metallic, having a melting point of 254° C. and a density of 9.4 g. per cc. Hardness is similar to lead, and it exists in two allotropic forms.

4-204. Distribution of Interference Lines on the X-Ray Diffraction Pattern of Annealed Martensite. G. Kurdiumov and L. Lysak. *Journal of Technical Physics (U.S.S.R.),* v. 17, Sept. 1947, p. 993-1002. (In Russian.)

Analysis of results of experiments plus data of other investigators indicates that, below 200° C., four factors influence the distribution. These are: fusion of pairs from the tetragonal martensite lattice; heterogeneity of the solid solution; the small size of coherent regions; and stresses of the second type. However, from 200 to 250°, the first two factors are of lesser importance, and have no effect at higher temperatures.

4-205. Verschijnselen bij de Veroudering van Metallische Systemen. (Phenomena in the Precipitation Hardening Metallic Systems.) Part II. H. C. J. de Decker. *Metalen,* v. 2, Oct. 1947, p. 25-29.

Some lead alloys containing about 98% Pb, with Sb or Sn present as alloying elements, show aging and age hardening properties. Some of the alloys contained small quantities of Zn.

4-206. Isomerien und Substitutionen. II. Mitteilung. Krystalline Konfigurationen. (Isomerism and Substitutions. Part II. Crystalline Configurations.) Paul Niggli. *Helvetica Chimica Acta,* v. 30, Oct. 15, 1947, p. 1562-1591.

Results of a fundamental study of crystal structure in regular and irregular solid solutions of metals and nonmetals. Coordination values for the different types of lattices are calculated.

4-207. Zur Kristallitgrosse Dunner Antimonschichten. (Crystallite Size in Thin Layers of Antimony.) W. Lotmar. *Helvetica Physica Acta,* v. 20, Oct. 25, 1947, p. 441-444.

Photomicrographs of antimony crystallites having diameters no greater than 10μ are presented which establish that the crystallites form a mosaic where the parts, about 30 mμ in diameter, vary in the direction of the c-axis by about 1 to 2° whereas the a-axis is parallel to the layer surface.

4-208. Etude Micrographique de l'Ecrouissage et de la Recristallisation de l'Aluminium Extra-Pur. (Micrographic Study of Cold Hardening and Recrystallization of Very Pure Aluminum.) Paul Lacombe and Louis Beaujard. *Revue de Metallurgie,* v. 44, March-April 1947, p. 71-76.

Electropolished aluminum specimens were photomicrographed and effects of electropolishing on localization of cold hardening and recrystallization along the grain boundaries were studied. Profusely illustrated.

4-209. Etude Fractographique des Alliages Fer-Chrome. (Fractographic Study of Ferrochromium Alloys.) Carl A. Zapffe. *Revue de Metallurgie,* v. 44, March-April 1947, p. 91-95; discussion, p. 95-96.

Development of fractography is referred to briefly, but the major part of article gives results of a fractographic study of various ferrochromium alloys whose Cr content varied from 7.70% to 28.67%. 13 ref.

4-210. Contribution à l'Etude des Ruptures par Decohesion Prematuree. (Contribution to the Study of Ruptures Due to Premature Slip.) Walter Soete. *Soudure et Techniques Connexes,* v. 1, March-April 1947, p. 68-76; May-June 1947, p. 93-106.

Various test procedures. Two aspects of the problem of ruptures: mechanical (theory of elasticity) and physical. Tangential stresses and normal stresses causing slip, which leads to rupture; resistance scaling of the atoms, monocrystals, and crystalline aggregates. Tests verifying the hypothesis of Henucky Huber, and von Mises, and that of Lame were conducted.

4-211. Comparison of Crystal Structures of Ten Wrought Heat Resisting Alloys at Elevated Temperatures With Their Crystal Structures at Room Temperatures. J. Howard Kittel. *National Advisory Committee for Aeronautics Technical Note No. 1488,* Nov. 1947, 11 p.

The following alloys were investigated: S-816, S-590, Hastelloy B, 19-9 W-Mo, N-155, 16-25-6, K-42-B, Inconel X, Nimonic 80, and Type 347 stainless steel. Observations were made of the crystal structure of the alloy at temperatures of 1200, 1500, and 1800° F. using a Geiger-counter X-ray spectrometer modified for high-temperature X-ray diffraction studies.

4-212. Report of Joint Research Committee on Effect of Temperature on the Properties of Metals. *American Society for Testing Matarials Proceedings,* v. 46, 1946, p. 180-187.

Report of activities and finances plus an appendix on Studies on Susceptibility of Casting Steels to Graphitization, by J. J. Kanter and E. A. Sticha.

4-213. Effect of Gas on the Properties of Magnesium Sand Casting Alloys. R. S. Busk and R. F. Marande. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 272-282.

Previously annotated in R.M.L., v. 2, 1945.

4-214. Diffusion of the Stable Isotopes of Nickel in Copper. William A. Johnson. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 114-126; discussion, p. 126-127.

Previously appeared in *Metals Technology,* June 1946, T.P. 2007.

4-215. The Binary Alloys of Indium and Tin. Colin G. Fink, Eric R. Jette, Sigmund Katz, and Frank J. Schnettler. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 229-241; discussion, p. 241.

4-216. A Thermodynamic Study of the Tin-Antimony System. Rudolph O. Frantik and Hugh J. McDonald. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 243-251.

Refers to electrochemical cells. Previously annotated in R.M.L., v. 2, 1945.

4-217. A Thermodynamic Study of the Tin-Silver System. R. O. Frantik and H. J. McDonald. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 253-260; discussion, p. 261-262.

Refers to electrochemical cells. Previously annotated in R.M.L., v. 2, 1945.

4-218. Experimental Studies of Continuous Cooling Transformations. C. A. Liedholm. *Transactions of American Society for Metals,* v. 38, 1947, p. 180-208.

Previously annotated in R.M.L., v. 3, 1946, item 4-108.

4-219. A Periodic Chart for Metallurgists. Carl A. Zapffe. *Transactions of American Society for Metals,* v. 38, 1947, p. 239-265; discussion, p. 265-270.

Previously annotated from R.M.L., v. 3, 1946, item 4-105.

4-220. Some Special Metallographic Techniques for Magnesium Alloys. P. F. George. *Transactions of American Society for Metals,* v. 38, 1947, p. 686-708; discussion, p. 708.

Previously annotated in R.M.L., v. 3, 1946, item 4-102.

4-221. Plastic Deformational Analyses on Pure Magnesium. Louis A. Carapella and William E. Shaw. *Transactions of American Society for Metals,* v. 38, 1947, p. 729-750; discussion, p. 750-756.

The ball indentation methods proposed by Meyer and Hargreaves are used to evaluate empirical indices defining both work hardening and plastic flow properties. Results show a definite departure from the Meyer law at high loads. The Hargreaves plastic flow coefficient also exhibited an anomalous behavior. Tridimensional stress components induced by the ball indenter at high loads on a polycrystalline system having a large degree of preferred orientation is the proposed explanation.

4-222. The Effects of Microstructure on the Mechanical Properties of Steel. J. H. Hollomon, L. D. Jaffe, D. E. McCarthy, and M. R. Norton. *Transactions of American Society for Metals,* v. 38, 1947, p. 807-844; discussion, p. 844-847.

Previously annotated in R.M.L., v. 3, 1946, item 4-111.

4-223. Factors Influencing the Pearlitic Microstructure of Annealed Hypoeutectoid Steel. R. A. Grange. *Transactions of American Society for Metals,* v. 38, 1947, p. 879-898; discussion, p. 898-908.

Previously annotated in R.M.L., v. 3, 1946, item 4-112.

4-224. A Metallographic Etchant to Reveal Temper Brittleness in Steel. J. B. Cohen, A. Hurlich and M. Jacobson. *Transactions of American Society for Metals,* v. 39, 1947, p. 109-136; discussion, p. 136-138.

Previously annotated in R.M.L., v. 3, 1946, item 4-106.

4-225. Changes in Austenitic Chromium-Nickel Steels During Exposures at 1100 to 1700° F. Peter Payson and Charles H. Savage. *Transactions of American Society for Metals,* v. 39, 1947, p. 404-439; discussion, p. 439-452.

Previously annotated in R.M.L., v. 3, 1946, item 4-107.

4-226. Constitution of the System Indium-Tin. F. N. Rhines, W. M. Urquhart, and H. R. Hoge. *Transactions of American Society for Metals,* v. 39, 1947, p. 694-711; discussion, p. 711-712.

Previously annotated in R.M.L., v. 3, 1946, item 4-104.

4-227. Stability of Austenite in Stainless Steels. C. B. Post and W. S. Eberly. *Transactions of American Society for Metals,* v. 39, 1947, p. 868-888; discussion, p. 888-890.

Previously annotated in R.M.L., v. 3, 1946, item 4-103.

4-228. Isothermal Transformation of Austenite. Axel Hultgren. *Transactions of American Society for Metals,* v. 39, 1947, p. 915-989; discussion, p. 989-1005.

Previously annotated in R.M.L., v. 3, 1946, item 4-109.

4-229. Effect of 16 Alloying Elements Upon the Grain Size of Cast 4.5% Copper-Aluminum Alloy. Harold B. Bowen, Jr., and Harold Bernstein. *Transactions of American Society for Metals,* v. 40, 1948, p. 209-222.

Experimental ingots of 4.5% Cu-Al alloy containing percentages of the elements under consideration varying from 0 to 1.4% were cast at 1350° F. under conditions calculated to produce coarse grains. After suitable preparation, the ingots were etched and their grain sizes measured. The refining effects of Ti, Cb, and Zr, separately, were tested upon superheated melts at 1750° F. The effects of various combinations of elements and the effect of heat treatment upon grain size were determined. Radiographic examination indicated that dendritic characteristics were markedly altered by refining agents.

4-230. The Location of Alloying Metals in White Cast Iron. H. A. Schwartz and James Hedberg. *Transactions of American Society for Metals,* v. 40, 1948, p. 223-230; discussion, p. 230-232.

See item 4-109.

4-231. Graphitization of Steel at Elevated Temperatures. A. B. Wilder and J. D. Tyson. *Transactions of American Society for Metals,* v. 40, 1948, 233-249; discussion, p. 249-262.

See item 4-110.

4-232. Concept of the Hydrogen Potential in Steam-Metal Reactions. Carl A. Zapffe. *Transactions of American Society for Metals,* v. 40, 1948, p. 315-352; discussion, p. 352-354.

See item 4-111.

4-233. The Dimensional Stability of Steel. Part III. Decomposition of Martensite and Austenite at Room Temperature. B. L. Averbach, M. Cohen, and S. G. Fletcher. *Transactions of Ameri-*

can Society for Metals, v. 40, 1948, p. 728-754; discussion, p. 754-757.
See item 4-107.

4-234. Acicular Transformations in Alloy Steel. E. A. Loria and H. D. Shephard. *Transactions of American Society for Metals,* v. 40, 1948, p. 758-774; discussion, p. 774.
See item 4-108.

4-235. The Distribution of Oxygen and Nitrogen in an Alloy Steel Ingot. C. F. Sawyer, J. W. Spretnak, and G. Derge. *Transactions of American Society for Metals,* v. 40, 1948, p. 922-934.
See item 4-112.

4-236. Some Characteristics of the Metastable Austenite of 4 to 6% Chromium + ½% Molybdenum Cast Steel. Glen J. Guarnieri and J. J. Kanter. *Transactions of American Society for Metals,* v. 40, 1948, p. 1147-1164.

A technique for conducting both high-temperature tensile and impact tests on metastable austenite; also a method for indicating the magnitude and nature of the stress effect on the austenite reaction. Stresses capable of plastically deforming the austenite at the transformation temperature definitely accelerated both the nucleation and the growth process of the reaction at least at temperatures below the apex of the TTT-curve. Application of the knowledge obtained is believed to be of value in various forging, heat treating, casting, and welding operations.

SECTION V

POWDER METALLURGY

5-1. Copper-Base Powder Metallurgy Parts. Herbert Chase. *Materials & Methods,* v. 24, Dec. 1946, p. 1439-1444.

Parts made in the form of sintered copper-base compacts. Significance of their purity, electrical and electronic characteristics, resistance to corrosion, and malleability. Competitive considerations and a few notes on design.

5-2. Metal Powders. David B. Pall. *Interchemical Review,* v. 5, Autumn 1946, p. 59-68.

Various aspects of the manufacture and more recent applications of metal powders.

5-3. Powder Metallurgy Offers New Approach to Lower Costs. Joseph Bonnano. *Production Engineering & Management,* v. 18, Dec. 1946, p. 51-55.

Product improvement and reduced processing cost have resulted from an extensive use of powder metallurgy for mass producing small parts at the Lionel Corp.

5-4. The Uses of Powder Metallurgy in Automobile Engineering. Part I. Ferrous Powder Metallurgy. J. A. Judd. *Institution of Automobile Engineers Journal,* v. 15, Dec. 1946, p. 83-100.

Techniques outlined. Limitations and applications in Britain to bushings, valve guides, oil pump gears, electrical components and piston rings. Possible future developments.

5-5. The Uses of Powder Metallurgy in Automobile Engineering. Part II. Nonferrous Powder Metallurgy. W. H. Tait. *Institution of Automobile Engineers Journal,* v. 15, Dec. 1946, p. 101-110; appendix, p. 110-114.

Limitations and advantages of sintering and applications to bearings, bushings, thrust washers, filters, cylinder liners, clutch and brake friction plates, starter brushes, and for cutting tools. Applications to moldable compositions of mixtures of metal powders with thermosetting resins and future possibilities. Appendices give information concerning furnace atmospheres for sintering, sintering costs, specifications of porous bearings and bushings and of steel-backed lead-bronze bushings.

5-6. Powder Metallurgy. W. H. Tait. *Metal Industry,* v. 70, Jan. 10, 1947, p. 30-32.

Better presses and pressing techniques, more efficient controlled-atmosphere furnaces, and nonmetallic additions to influence the properties of the article, or to make the powder behave better in the press. (To be concluded.) (Presented before the Institution of Automobile Engineers.)

5-7. Large-Scale Production of Metal Hydrides. Herman W. Zabel. *Chemical Industries,* v. 60, Jan. 1947, p. 37-39.

Production, properties, and uses in chemical and metallurgical industries. Useful in preparation of powdered chromium alloys.

5-8. Some Properties of Engineering Iron Powders. C. J. Leadbeater, L. Northcott, and F. Hargreaves. *Iron and Steel Institute Advance Copy,* Dec. 1946, 24 p.

Properties of 28 commercial iron powders, together with those of compacts prepared from them by simple pressing and sintering technique. The majority of the powders were prepared by either the oxide-reduction or the electrolytic methods but individual samples of the carbonyl, abrasion, and chloride-reduction methods were included. A large number of simple correlation coefficients have been computed for the properties considered. Many factors contribute to the behavior of a powder when it is pressed and sintered, and the properties of the compact are not dependent solely upon any one property of the powder. Among the more important requirements for high tensile strength are small particle size and freedom of the surface of the particles from oxidation.

5-9. Experimentation Plays an Important Role in Work of Yonkers Electro Metal Plant. Joseph G. Cowley and Floyd McKnight. *Modern Industrial Press,* v. 9, Jan. 1947, p. 20, 22, 24, 26.

American Electro Metal Corp.'s laboratory is equipped with copies in miniature of all of the plant's facilities including small presses and sintering furnaces. Pressing and coining methods. Illustrated.

5-10. Some Metallurgical Aspects of Cemented Carbides. John C. Redmond. *Iron Age,* v. 159, Jan. 30, 1947, p. 42-45, 150.

Performance of carbide tools is often as much a matter of the manufacturing technique used as of the chemical composition. Various factors such as grain size and porosity and their effects on physical properties discussed.

5-11. Latest Trends in Powder Metallurgy. W. G. Cass. *Chemical Age,* v. 56, Jan. 4, 1947, p. 5-10.

Historical background; recent developments; thermal decomposition; size of powder grains; inherent cohesive forces; hard refractories; vibration to assist compacting; porous steel skeleton; engine parts; machine tools; vacuum working. 22 ref. (To be continued.)

5-12. Proceedings Second Annual Meeting. *Metal Powder Association,* **1946, 86 p.**

Symposium of eight papers was devoted to iron powder metallurgy, except for one paper on sintered tungsten and tungsten alloys and one on furnace atmospheres for sintering. Also includes use of graphite in iron powder compacts; test methods for iron powders; properties of iron powder parts; and a discussion of iron powder costs. Includes discussion of each paper.

5-13. The Effect of Composition on Physical Properties of Tungsten-Copper-Nickel Compacts. Henry H. Hausner. *Powder Metallurgy Bulletin,* v. 2, Jan. 1947, p. 6-11.

Twenty-eight sample compositions were prepared and tested. They varied between approximately 20-80 and 80-20 W-Cu, plus ½ to 1% Ni. Volume change on sintering, electrical conductivity, thickness before and after hot hammering, and Brinell hardness.

5-14. Powder Metallurgy. (Concluded.) W. H. Tait. *Metal Industry,* v. 70, Jan. 17, 1947, p. 43-46.

Modern uses of sintered powder products such as bearings, steel-backed lead-bronze bushes, filters, liners, clutch and brake friction plates, starter brushes, diamond-impregnated cutting tools, and moldable compositions.

5-15. Powder Metallurgy. B. E. Berry. *Metalen,* v. 1, Jan. 1947, p. 77-84. (In English.)

Principles and application of powder metallurgy during the war in England and in other countries.

5-16. The Moment of Active Deformation. Harry L. Strauss, Jr. *Metal Progress,* v. 51, Feb. 1947, p. 254-255.

A method of hot pressing of powdered metals. Laboratory device for hot pressing in a carbon die. Comparative working pressures and working data, hot pressing versus conventional methods.

5-17. The Work of Huttig and Collaborators on the Mechanism of Sintering. W. D. Jones. *Metal Treatment,* v. 13, Winter 1946-1947, p. 265-278.

Reviews 13 papers so far available from the Prague School covering an extended systematic investigation of the changes taking place when metal powders are heated at increasing temperatures, studying the changes involved by means of X-ray diffraction, adsorption, pycnometric, microscopical, potentiometric and other methods.

5-18. Trends in Powder Metallurgy. Part II. W. G. Cass. *Chemical Age,* v. 56, Feb. 1, 1947, p. 199-202.

Metallic hydrides, rare metal powders, metallic cohesion. Typical uses and principal methods of preparation for the different metal powders. (Conclusion.)

5-19. Plastic Deformation in Metal Powder Compact. Robert Kamm, Morris Steinburg and John Wulff. *Metals Technology,* v. 14, Feb. 1947, T. P. No. 2133, 15 p.

The fact that shrinkage in one direction and growth in another often occur during sintering led to an investigation of density gradients in cold-pressed metal powders. For this purpose, a deformable lead grid within iron powder was used. After pressing, the compact was radiographed, giving the deformed-grid pattern. From the radiograph, density and deformation, strain distribution and stress trajectories are readily measured.

5-20. Cemented Hard Carbide Compositions. Philip M. McKenna. *Tool Engineer,* v. 18, March 1947, p. 23-26.

The place of cemented carbide tools in man's progress. Applications and possible future applications in tools and other products. Physical and mechanical properties.

5-21. Sintered Metal Cavities. *Modern Plastics,* v. 24, March 1947, p. 144-145.

How plastic-molding cavities, difficult and costly to hob or machine, can be made by pressing metal powder over hob held in die, and baking.

5-22. Preparation of Iron Powder Compacts and Powders for Microscopic Examination. H. M. Jamison and E. S. Byron. *Metal Progress,* v. 51, March 1947, p. 437-440.

Precautions which must be taken in the preparation of samples. Procedure described.

5-23. Powder Metallurgy; Influence of Some Processing Variables on the Properties of Sintered Bronze. H. L. Wain. *Australian Council for Aeronautics, Melbourne, Australia, Report ACA-25,* June 1946, 20 p.

Study of compacting pressure and temperature, and time of heat treatment. Mechanism of alloying between copper and tin particles to form alpha bronze during heat treatment of copper-tin-graphite compacts. Time of heat treatment in excess of 30 min. was found to be of less importance than compacting pressure and heat treatment temperature.

5-24. Powdered Metals and the Engineer. H. W. Greenwood. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 90, Dec. 1946, p. 101-115; discussion, p. 115-125.

Powder metallurgy processes, products, and applications.

5-25. Principles of the "RZ" Process of Iron Powder Production. Scholz. *Powder Metallurgy Bulletin,* v. 2, March 1947, p. 30-34.

German process which has been developed on a laboratory scale. A special low-silicon iron containing 4% carbon is atomized by compressed air at 2460° F. The atomized product, consisting of hollow spheres or spherical fragments of iron covered with an oxide layer, is annealed at 1650° F., to convert it into a readily compactible powder. (Translated from PB 17380, Office of Publication Board, Department of Commerce, Washington, D. C.)

5-26. Electrolytic Method of Preparation of Powdered Nickel. A. I. Levin. *Journal of Applied Chemistry (U.S.S.R.),* v. 19, no. 8, 1946, p. 779-792. (In Russian.)

Cathodic precipitation of nickel in powdered form followed by annealing of the product in hydrogen at approximately 700° C. is the best method for production of high-activity powdered nickel.

5-27. Cathodic Preparation of a Finely Dispersed Nickel. M. Loshkarev, O. Gornostaleva, and A. Kriukova. *Journal of Applied Chemistry (U.S.S.R.),* v. 19, no. 8, 1946, p. 793-800. (In Russian.)

Optimum conditions for preparation of powdered nickel from pure $NiSO_4$ solution and from electrolytes containing copper ions. The products possess high activity in both cases.

5-28. Production of Cemented Tungsten Carbide. Stuart H. Brierley. *Metallurgia,* v. 35, March 1947, p. 253-254.

The double-sinter and the single-sinter methods and the advantages of each.

5-29. Iron-Graphite Powder Compacts. Alexander Squire. *Metals Technology,* v. 14, April 1947, T. P. 2164, 10 p.

Effects of material and processing variations upon the tensile properties of steel formed from mixtures of iron and carbon. The study was made to provide information regarding the properties obtainable in iron-carbon compacts as influenced by forming pressure, sintering temperature, and graphite particle size.

5-30. Density Relationships of Iron-Powder Compacts. Alexander Squire. *Metals Technology,* v. 14, April 1947, T. P. 2165, 19 p.

Difficulty experienced in the determination of the mechanical properties of compacted components has made design engineers hesitant to use powder-metal parts. The work described is an attempt to remedy the situation. Effects of variations in density of compacts from several types of iron powder on mechanical properties. Effects of die configuration and frictional forces, of sintering temperature, and of shape of compact, on density.

5-31. Powder Metallurgy. J. W. Lennox. *Machinery (London),* v. 70, April 3, 1947, p. 337-344.

Manufacture and control of powder; pressing the compact; sintering; coining for accurate size control; limitations of the pressing operation; examples of parts produced; physical properties.

5-32. Advantages of Self-Lubricating Bearings Made by Powder Metallurgy. M. T. Victor. *Canadian Metals & Metallurgical Industries,* v. 10, April 1947, p. 18-21, 38.

Established and tested procedures and processes wherein powder metallurgy has proven its advantages over orthodox methods in the production of bearings and bushings.

5-33. Production of Cemented Tungsten Carbides. E. J. Sandford and E. Ineson. *Metallurgia,* v. 35, April 1947, p. 298-300.

Correspondents from two firms engaged in the manufacture of tungsten carbides criticize Brierley's paper in March issue.

5-34. Powder Metallurgy—Process or Product? Earl S. Patch. *Iron Age,* v. 159, May 22, 1947, p. 64-66.

The favorable economic aspects of the use of metal-powder products. Recommends that powder metallurgy be considered a process rather than a product.

5-35. New Developments in Powder Metallurgy. G. J. Comstock and J. D. Shaw. *Iron Age,* v. 159, May 22, 1947, p. 67-68.

Production of precast powders and hot pressing of powders. Hot pressing appears to be the means of fabricating many of the precast alloy powders at pressures far below those now required by cold pressing.

5-36. Principe d'une Methode pour l'Obtention Rapide des Surstructures. Application aux Alliages du Type Pt-Fe. (Principles of a Method for the Rapid Production of (Relaxed) Structures. Application to the Alloys of the Pt-Fe Type.) Louis Weil. *Comptes Rendus,* v. 224, March 1947, p. 923-925.

Very slow cooling is necessary in order to obtain an orderly arrangement of the atoms in an alloy upon cooling. The author proposes the production of alloys having such structures by means of powder metallurgy. The production of Pt-Fe, Pt-Co, and Pt-Ni powders by reduction of the respective metal platinocyanates in hydrogen at 500 to 600° C. for 2 hr. The value of the method for preparation of alloys having extremely long relaxation times on cooling.

5-37. Progress in Powder Metallurgy. Earl R. Parker. *Mining World,* v. 9, May 1947, p. 25-27.

Summarizes techniques and developments in this field.

5-38. Expanding Metal Powder Use Stressed at Metal Powder Association Meeting. *Iron Age,* v. 159, June 5, 1947, p. 84-86.

Reviews papers presented.

5-39. Production and Uses of Iron and Other Metal Powders. *Chemical Age,* v 56, May 17, 1947, p. 641-642.

German practice. (Abstracted from B.I.O.S. Report No. 706.)

5-40. Powder Metallurgy. Gregory J. Comstock. *Federal Science Progress,* v. 1, June 1947, p. 34-35.

Powder metallurgy process; applications and limitations; wartime advances.

5-41. Furnace Atmospheres for Sintering. Part I. Hydrogen. A. Webber and A. G. Hotchkiss. *Industrial Heating,* v. 14, May 1947, p. 742-744, 746, 748, 750, 752, 754.

Means for purifying and analyzing the gas, and equipment used. (Presented at 1946 meeting of Metal Powder Assoc., New York City.)

5-42. Production of Hot Plates by Powdered Metallurgy. *Machinery (London),* v. 70, May 15, 1947, p. 509.

Design of aluminum hot plate made in Germany.

5-43. Postwar Activities of the Metallwerk Plansee in Reutte (Tyrol). Paul Schwarzkopf. *Powder Metallurgy Bulletin,* v. 2, May 1947, p. 52-53.

New developments in powder metallurgy at the above plant.

5-44. Sintered Iron and Steel for Structural Parts. R. Kieffer, F. Benesovsky, and H. J. Bartels. *Powder Metallurgy Bulletin,* v. 2, May 1947, p. 54-69.

Properties, applications, and production techniques for a variety of articles and parts. European developments. 40 ref.

5-45. Polyvinyl Acetate in Powder Metallurgy. Harry L. Strauss, Jr. *Modern Plastics,* v. 24, June 1947, p. 196, 198.

Process uses a resistance-heated carbon die which applies variable heat and pressure from 100 to 2400° F. With this process, such metals as copper, tin, nickel, and zinc can be alloyed and hot pressed under adjustable heat and pressure to produce alloy metals having a wide range of applications. Five per cent polyvinyl acetate is added to improve the flowability of the mass, thus making it possible to produce odd-shaped items.

5-46. Recent Developments in Powder Metallurgy. J. A. Judd. *Engineering Materials,* v. 5, Feb-April 1947, p. 6-13.

A review.

5-47. Sintered Permanent Magnets. S. J. Garvin. *Engineering,* v. 163, May 30, 1947, p. 445-446; June 6, 1947, p. 465-467.

The general principles and applications of powder metallurgy; the problems involved in the production of Alnico and Alcomax alloys by sintering. A study of the phase diagrams of Al-Fe, Al-Ni, and Al-Co alloys led to the selection of an Al-Fe alloy containing 48% Fe as the most suitable for the liquid phase, which must be present to facilitate sintering. The second installment discusses the basic principles for preparation of the compacts, and illustrates a number of special forms of the magnets. Magnetic properties of the different cast and sintered alloys.

5-48. How to Evaluate Engineering Properties of Iron Powder Parts. Alexander Squire. *Materials & Methods,* v. 25, June 1947, p. 89-93.

Correlation between mechanical properties and performance characteristics. Results of experiments on the relationships between processing conditions and quality characteristics. Direct use of mechanical tests seldom gives a true picture as to the ability of similarly produced parts to perform satisfactorily.

5-49. A Challenge: Powder Metallurgy. A. J. Langhammer. *Modern Metals,* v. 3, June 1947, p. 13.

Properties and applications of the various Oilite bearing metals and alloys. Potential applications and

metallurgical improvements desired. One of these is an oxide-free aluminum powder.

5-50. Modern Powder Metallurgy. H. W. Greenwood. *Engineering,* v. 163, June 13, 1947, p. 492.

A general discussion of recent progress.

5-51. Rate of Sintering of Copper Powder. A. J. Shaler and J. Wulff. *Physical Review,* v. 72, July 1, 1947, p. 79-80.

Equations are derived for rate of shrinkage, at various temperatures, of powder aggregates containing many pores of uniform size. Equations are also derived to include the presence of foreign gases inside the pores and outside the aggregate.

5-52. Low Versus High Pressure in Making Cemented Carbide Tools. Anton Niedzwiedski. *Metal Progress,* v. 52, July 1947, p. 104.

Results of prewar experience in Poland indicate the superiority of high pressure pressing.

5-53. Sur la Cinetique de l'Oxydation de l'Aluminium en Poudr. (Kinetics of Oxidation of Aluminum Powder.) Haldun N. Terem. *Comptes Rendus,* v. 224, May 12, 1947, p. 1351-1353.

Oxidation of powdered 250 to 300 mesh 99.99% aluminum was investigated at temperatures of 550 to 1050° C. in moist and dry air. Results do not agree completely with the Valensi law of oxidation, but do conform to Arrhenius' law. The rate of oxidation and point at which an inhibiting layer of aluminum forms.

5-54. Sintered Iron Shell Bands. *Iron and Steel,* v. 20, July 1947, p. 370.

Production of shell driving bands in Germany by a powder metallurgy process.

5-55. Powder Metallurgy. Part I. *Metal Industry,* v. 71, July 11, 1947, p. 27, 32.

A review of papers presented at recent symposium of Iron and Steel Institute.

5-56. Improved Engineering Properties of Parts Made From Iron Powders. Claus G. Goetzel. *Product Engineering,* v. 18, Aug. 1947, p. 115-119.

The development of better properties through the various procedures which have been and are being used.

5-57. Powder Metallurgy. Part II. *Metal Industry,* v. 71, July 25, 1947, p. 70, 73.

Magnetic powders and products including dust cores, carbonyl iron, Fe-Ni-Al magnets.

5-58. Powder Metallurgy. Part III. Hard Metal Carbides. *Metal Industry,* v. 71, Aug. 8, 1947, p. 109.

General features of the method of manufacturing sintered carbides; mechanism of the process; theoretical principles.

5-59. Ford Utilizes Extrusion Method for Producing Metal Powder Gears. E. E. Ensign. *Automotive Industries,* v. 97, Aug. 15, 1947, p. 30-31, 72.

A method of producing metal powder parts at a lower cost and to closer tolerances than has been possible heretofore with conventional tools.

5-60. Furnace Atmospheres for Sintering. Part III. H. M. Webber and A. G. Hotchkiss. *Industrial Heating,* v. 14, Aug. 1947, p. 1254, 1256, 1258, 1260, 1262, 1264, 1266, 1268, 1270.

The atmosphere used in sintering metal-powder compacts must be such as to prevent any undesirable chemical reactions from taking place. Hydrogen, dissociated ammonia and partially burned fuel gas and means of purifying these. A few typical gas analyzers for detecting the purity. (To be continued.)

5-61. Powder Metallurgy; an Indexed Bibliography of the Literature. G. H. S. Price. *Metal Treatment,* v. 14, Summer 1947, p. 113-130.

210 additional references and subject and author indexes. (Concluded.)

5-62. Production Processes—Their Influence on Design. Part XXVII—Powder Metallurgy. Roger W. Bolz. *Machine Design,* v. 19, Sept. 1947, p. 139-146.

Design principles for items made by powder metallurgy. Typical average properties of powder metal parts from different metals and alloys and treated in different ways.

5-63. Symposium on Powder Metallurgy; Hard Metal Carbides. *Metallurgia,* v. 36, Aug. 1947, p. 197-199.

Reviews papers devoted to hard metal carbides, presented at recent meeting of Iron and Steel Institute (British).

5-64. Introduction to Seminar—Review of Literature on Pressing of Metal Powders. Richard Paul Seelig. *Metals Technology,* v. 14, Aug. 1947, 20 p.; discussion, p. 13-29.

Operations which occur between the time the powder is filled into the cavity and the compact is ejected from the die. Does not concern hot pressing, coining or sizing feed, flow problems, commercial presses, or designs. 65 ref. (Presented at New York Meeting of A.I.M.E., March 1947.)

5-65. The Losses in Carbon, Sulphur and Oxygen During the Sintering of Iron Powders in a Hydrogen Atmosphere. Gustav F. Huttig and Karl Sedlatschek. *Powder Metallurgy Bulletin,* v. 2, Sept 1947, p. 80-84. (Translated from the German.)

It was found that heating at temperatures below 500° C. lowers the oxygen content without markedly decreasing the carbon content. Therefore, low-temperature reduction will not result in complete elimination of oxygen. A sintered steel practically free of oxygen can be produced either by using a powder mixture which contains considerably more carbon than required in the finished product, or by processing in a sintering atmosphere containing CO or hydrocarbons. Effects of addition of chlorides to the powder, or of chlorine compounds to the sintering atmosphere.

5-66. Electrolytic Copper Powder. *Metal Industry*, v. 71, Sept. 12, 1947, p. 226-227.

Production methods employed by German technicians. (Abstracted from a B.I.O.S. report.)

5-67. Precision Powder Spreader and Other Highlights of Bearing Strip Process. *Automotive Industries*, v. 97, Oct. 1, 1947, p. 46, 78, 82.

Procedures and equipment for production of copper-lead sintered metal-powder bearing at Greenville Mich., plant of Federal-Mogul Corp. Unique device for spreading copper powder over steel strip so as to produce a parallel top surface and uniformity of layer thickness to a tolerance of 0.001 in.

5-68. The Manufacture of Copper-Lead Bearings From Metal Powder. E. R. Darby. *Canadian Metals & Metallurgical Industries*, v. 10, Sept. 1947, p. 21-22.

Process developed by Federal-Mogul Corp., Detroit.

5-69. Pressed and Sintered Iron Powders. W. Rostoker. *Canadian Institute of Mining and Metallurgy Transactions* (bound with *Canadian Mining and Metallurgical Bulletin*), v. 50, Sept. 1947, p. 497-508.

Results of a study of the effect of particle-size distribution on their physical properties.

5-70. Impact of Industrial Revolution on Powder Metallurgy. Joseph E. Drapeau, Jr. *Metal Progress*, v. 52, Oct. 1947, p. 606-608.

Development of powder metallurgy and its applications.

5-71. Sinteralumina. Part I. Felix Singer and Hans Thurnauer. *Metallurgia*, v. 36, Sept. 1947, p. 237-242.

Investigations on sintered alumina and the main factors which affect the usefulness of this material. Particular attention to the chemistry of reactions in the solid phase and to the orientation, growth, and general characteristics of the crystallites in sintered alumina in particular. 18 ref. (To be continued.)

5-72. Powdered Metal Filters. H. Seymour. *Mining Magazine*, v. 77, Oct. 1947, p. 206-208.

Porous filters of bronze and stainless steel are available commercially in various shapes. They are made from powdered metal by a sintering process. Possible uses.

5-73. The Sintering of Tungsten Carbide With Cobalt Binder. E. C. Mantle. *Metal Treatment*, v. 14, Autumn 1947, p. 141-148.

Sintering tungsten carbide with 4.5 to 35% Co added. It is considered that there is strong evidence for the formation of a liquid phase during sintering at temperatures slightly above 1300° C.

5-74. Manufacture and Application of Sintered Carbides. E. M. Trent. *Engineer*, v. 184, Oct. 24, 1947, p. 396-397.

Production, physical properties, and structure, including variations with composition. (To be continued. Condensed from papers presented to the Institution of Production Engineers.)

5-75. Powder Metallurgy in Plastic Cavity Mold Manufacturing. Oliver Pritchard. *Industrial Gas*, v. 26, Nov. 1947, p. 7-9, 27-28.

Powder metallurgy for mass production of molds having complex designs and patterns.

5-76. Manufacture and Application of Sintered Carbides. H. Eckersley. *Engineer*, v. 184, Oct. 31, 1947, p. 420-422.

Condensed from papers presented to Institution of Production Engineers.

5-77. The Economy of Production of Structural Parts by Powder Metallurgy. Henry W. Fischer and Richard Paul Seelig. *Powder Metallurgy Bulletin*, v. 2, Nov. 1947, p. 128-134.

Cost savings possible for parts which can also be manufactured by other methods.

5-78. Some Properties of Iron-Silicon Alloys Produced From Powders. Robert Steinitz. *Powder Metallurgy Bulletin*, v. 2, Nov. 1947, p. 135-137.

Magnetic properties of Fe-Si armatures produced by powder metallurgy. Silicon was varied from 1.5 to 6%. 3% Si and a sintering temperature of about 2150° F. resulted in satisfactory products.

5-79. Electrolytic Iron Powder Production. W. J. Granberg. *Iron Age*, v. 160, Dec. 25, 1947, p. 70-72.

A process using insoluble anodes and a ferrous chloride electrolyte. Power, raw-material requirements, and operating techniques associated with this method are outlined on the basis of an anticipated production rate of 10 tons per day.

5-80. Some Properties of Aluminum Flake Powders. Gunter W. Wendon. *Paint Manufacture,* v. 17, Nov. 1947, p. 373-379.

Effects of shape and dimensions of the powders on their behavior in aluminum paint. Effect of method of manufacture on shape and sedimentation characteristics. 10 ref.

5-81. Sintered Carbides. Part I—Production and Properties. E. M. Trent. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 550-552, 636.

Previously abstracted from condensed version in *Engineer.* See item 5-74.

5-82. Sintered Carbides. Part II—Application in Industry. H. Eckersley. *Iron and Steel,* v. 20, Dec. 1947, p. 645-647.

Previously abstracted from condensed version in *Engineer.* See item 5-76.

5-83. Formation and Transformation Studies of Iron-Carbon Powder Alloys. John F. Kahles. *Transactions of American Society for Metals,* v. 38, 1947, p. 618-651; discussion, p. 651-658.

Previously annotated in R.M.L., v. 3, 1946, item 5-67.

5-84. Report of Committee B-9 on Metal Powders and Metal Powder Products. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 268-270.

Recommendations for changes in test methods. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

5-85. Use of Zirconium in the Vacuum Tube. Alfred N. Rogers. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 207-212; discussion, p. 212-213.

Previously annotated in R.M.L., v. 2, 1945.

5-86. Ductile Titanium—Its Fabrication and Physical Properties. R. S. Dean, J. R. Long, F. S. Wartman, and E. T. Hayes. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 382-398.

Previously annotated from *Metals Technology,* Feb. 1946, T.P. 1965 in R.M.L., v. 3, 1946.

5-87. Seminar on the Theory of Sintering. F. N. Rhines. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* v. 166, 1946, p. 474-487; discussion, p. 487-491.

Previously annotated from *Metals Technology,* Aug. 1946, T.P. 2043 in R.M.L., v. 3, 1946.

5-88. The Pressing Operation in the Fabrication of Articles by Powder Metallurgy. Richard P. Seelig and John Wulff. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* v. 166, 1946, p. 492-504; discussion, p. 504-505.

Previously annotated from *Metals Technology,* Aug. 1946, T.P. 2044 in R.M.L., v. 3, 1946.

5-89. Pressing Complicated Shapes From Iron Powders. Claus G. Goetzel. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* v. 166, 1946, p. 506-518; discussion, p. 518-519.

Previously annotated from *Metals Technology,* Oct. 1945, T.P. 1920 in R.M.L., v. 2, 1945.

5-90. Hot-Pressing of Iron Powders. Otto H. Henry and J. J. Cordiano. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* v. 166, 1946, p. 520-529; discussion, p. 529-532.

Previously annotated from *Metals Technology,* Oct. 1945, T.P. 1919 in R.M.L., v. 2, 1945.

5-91. Notes on Copper-Base Compacts and Certain Compositions Susceptible to Precipitation Hardening. F. R. Hensel, E. I. Larsen, and E. F. Swazy. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* v. 166, 1946, p. 533-544; discussion, p. 544-547.

Previously annotated from *Metals Technology,* Aug. 1945, T.P. 1810 in R.M.L., v. 2, 1945.

5-92. Silicide-Hardened Copper Compacts for Bearings. F. R. Hensel, E. I. Larsen and E. F. Swazy. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* v. 166, 1946, p. 548-555; discussion, p. 544-547.

Previously annotated from *Metals Technology,* Feb. 1946, T.P. 1976 in R.M.L., v. 3, 1946.

5-93. A Study of the Physical Properties and Microstructure of Sintered Steel. George Stern. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* v. 166, 1946, p. 556-570; discussion, p. 570-573.

Previously annotated from *Metals Technology,* Aug. 1946, T.P. 2045 in R.M.L., v. 3, 1946.

5-94. Nickel-Iron Alloys Produced by Powder Metallurgy. Laurence Delisle and Aaron Finger. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* v. 166, 1946, p. 574-586; discussion, p. 586-587.

Previously annotated from *Metals Technology,* Aug. 1946, T.P. 2046 in R.M.L., v. 3, 1946.

SECTION VI

CORROSION

6-1 Acetic Acid Versus Materials of Chemical Plant Construction. Part II. *Chemical Engineering,* v. 53, Dec. 1946, p. 205-206, 208, 210, 212, 214, 216, 218, 220.

Final portion of a symposium in which typical materials of construction are evaluated for service involving acetic acid. Includes chemical porcelain; steel containing 24% Ni, 20% Cr and 3% Mo; Hastelloy; lead; high-silicon iron; chemical stoneware; rubber lining; nickel and nickel alloys.

6-2. Graphitic Corrosion of Cast Iron. Laurie M. Leedom. *Journal of the American Water Works Association,* v. 38, Dec. 1946, p. 1392-1397.

Mechanism of graphitic corrosion. Recommends use of alloyed metal for valves to minimize corrosion.

6-3. The Variation in Corrosion Properties Over Two Magnesium Alloy Sheets. E. R. W. Jones and Marion K. Petch. *Journal of the Institute of Metals,* v. 73. Nov. 1946, p. 129-137.

Details and results of sea-water spray corrosion tests on chromate-treated specimens selected at regular intervals from two large sheets of magnesium alloy, one to each of specifications D.T.D. 118 and D.T.D. 120A (AZM), to discover any variation in corrodibility from part to part of the sheet.

6-4. Corrosion of Copper, Lead, and Lead Alloy Specimens After Burial in a Number of Soils for Periods up to Ten Years. P. T. Gilbert. *Journal of the Institute of Metals,* v. 73, Nov. 1946, p 139-174.

Estimates of the amount of corrosion showed that the corrosiveness of the soils differed markedly. The most corrosive soil caused about 50 times as much loss in weight of specimens as the least corrosive soil, and caused complete penetration of one ½-in bore pipe (4 lb. per yd.) in less than 5 years. It is considered that sulphate-reducing bacteria played an important part in the action taking place in the more corrosive soils. Difference in behavior of materials was less marked than differences between the soils. In the two most corrosive soils it would be unwise to bury unprotected pipes of any of the materials.

6-5. Attenuation of Forced Drainage Effects on Long Uniform Structures. Robert Pope. *Corrosion,* v. 2, Dec. 1946, p. 307-319.

Approximate equations have been developed which are useful in prediction of effects of forced drainage on cathodic protection of underground metallic structure. Soil and structure characteristics which enter into the equations. Charts show some of the relationships.

6-6. Cathodic Protection. C. H. McRaven. *Corrosion,* v. 2, Dec. 1946, p. 320-329.

How cathodic protection prevents corrosion. Effect of cathodic protection on other pipe lines in the vicinity and how to neutralize it.

6-7. Corrosion in High-Pressure Gas-Condensate Wells. H. Arthur Carlson. *Oil and Gas Journal,* v. 45, Dec. 21, 1946, p. 81-84.

Review of literature reveals lack of fundamental data on the effect of certain factors and indicates a definite need for correlation of data. Correlates and summarizes work that has been done so far to aid in planning future work. 10 ref.

6-8. Corrosion of Water Heaters. Part I. N. Booth, P. C. Davidge, G. H. Fuidge, and B. Pleasance. *Gas Journal,* v. 248. Dec. 11, 1946, p. 1047-1050, 1053.

The external corrosion of standard domestic heater burners and external surfaces upon which the gas flames impinge was investigated using various manufactured gases. The amount of corrosion was carefully determined

and correlated with sulphur content of the gases. (To be continued.)

6-9. Uber den Angriff von Metallen in Feuchten Dämpfen der Halogenwasserstoffsauren. (Metal Corrosion in Moist Vapors of Hydrohalic Acids.) W. Feitknecht. *Helvetica Chimica Acta,* v. 29, no. 7, p. 1801-1915.

Corrosion of zinc, cadmium, nickel and iron by air containing HCl and HBr. Theoretical explanation of the very different rates of attack on different metals.

6-10. Experience Shows Amines Stop Corrosion. R. S. Moncrief and M. E. Dreyfus. *Power,* v. 91, Jan. 1947, p. 81-83.

After operating for 33 consecutive months at a capacity factor of 110% or 15,000,000 lb. of steam a day, results show that amine introduced into feedwater eliminates corrosion problems in boiler-feed pumps. deaerating trays and heaters.

6-11. Magnesium. R. R. Rogers, D. A. Tetu, and H. Livingstone. *Metal Industry,* v. 70, Jan. 3, 1947, p. 9-10.

Experimental results indicate that magnesium and its alloys offer good resistance to corrosion when exposed to inland, indoor and outdoor atmospheric conditions, but much less in marine atmospheres. It is pointed out that they should resist marine atmospheric conditions when properly protected with paint. (Paper presented to the Electrochemical Society.)

6-12. Some Aspects of the Corrosion of Aluminum. P. F. Thompson. *Journal of the Council for Scientific and Industrial Research (Australia) Reprint,* v. 19, no. 2, May 1946, 9 p.

Relation of corrosion to film formation. Film growth and breakdown were traced by electrochemical measurement. Visual evidence of evolution of hydrogen on abraded aluminum and magnesium in neutral liquids has been obtained. The importance of minute "chafing" or "fretting" movements on the stability of machines and structures. Continuous abrasion apparatus.

6-13. Oxidation Resistant Alloys. Benjamin Lustman. *Steel,* v. 120, Jan. 20, 1947, p. 68-69, 116-119.

Theory of oxidation of metals and alloys, including rate equations for the different types. The structure of scales formed on oxidation, and methods for determining oxidation resistance. Relevant facts concerning several alloys.

6-14. Ueber die Korrosion von Metallen in Sauren Dämpfen. (Corrosion of Metals in Acid Fumes.) W. Feitknecht. *Schweizer Chemiker-Zeitung,* v. 29, Oct. 1946, p. 332-333.

The corrosion of zinc, cadmium, nickel, and iron in HCl and HBr vapor was investigated. Chemical natures of the corrosion products formed at different vapor pressures (concentrations) determined.

6-15. Corrosion of Water Heaters. (Concluded.) N. Booth, P. C. Davidge, G. H. Fuidge, and B. Pleasance. *Gas Journal,* v 248, Dec. 18, 1946, p. 1090-1094.

A discussion of the effects of time, thermal input, appliance design, and the presense of nitrogen oxides in the flue gas. Appendices contain methods for analysis of total sulphur content of gas and for analysis of deposits, and results of microscopic examination.

6-16. Corrosion Problems in High-Pressure Distillate Wells. Ralph H. Hock. *Oil Weekly,* v. 124, Jan. 27, 1947, p. 33-35.

Some methods followed by the Cotton Valley Field Operators Committee and others in detecting and controlling corrosion.

6-17. Investigations on the Effect of Zinc on the Corrosion of Some Magnesium Casting Alloys. F. A. Fox. *Journal of the Institute of Metals,* v. 73, Dec. 1946, p. 229-241.

Corrosion tests were carried out on unprotected magnesium alloys, with 8 and 9.5% aluminum and varying zinc contents, both in high-purity and in normal-purity material; alloys were immersed in 3% sodium chloride solution and some atmospheric-exposure tests were made.

6-18. Wet and Dry Chlorine Vs. Materials of Chemical Plant Construction. *Chemical Engineering,* v. 54, Jan. 1947, p. 211-212, 214.

Part I of a two-part symposium in which representative manufacturers of corrosion resistant materials discuss the suitability of their products for equipment exposed to wet and dry chlorine gas and chlorine water. Covers lead, high-silicon irons, and chemical porcelain. (To be continued.)

6-19. Results Obtained From Five Years of Cathodic Protection on 24-Inch Gas Line Rapidly Deteriorating From Bacterial Corrosion. Wm. E. Huddleston. *Corrosion,* v. 3, Jan. 1947, p. 1-7.

The line was coated with a commercial tar enamel, but was not wrapped. Results of inspection. Cathodic protection provided excellent results.

6-20. Corrosion Ratings for Metals. H. D Holler and R. A. Frye. *Corrosion,* v. 3 Jan. 1947, p. 8-21; discussion, p. 22.

Difficulty of providing tables or equations for the prediction of corrosion resistance of metals. Presents tables for various commercial alloys and points out their limitations.

6-21. Resistance of Some Nickel-Containing Alloys to West Texas Crudes.

B. B. Morton. *Corrosion*, v. 3, Jan. 1947, p. 23-34.

Recommends high-chromium steels for refining at temperatures above 500° F., and nickel and monel for lower temperature applications in refining, storage, and oil well equipment. Photographs show comparative corrosion results on different metals in actual use.

6-22. **Investigation of Electrolytic Corrosion of Steel in Concrete.** *Corrosion*, v. 3, Jan. 1947, p. 37-54.

Progress report of Committee on Electrolysis of the Association of American Railroads. Corrosion and current flow in several railroad foundation pedestals and the establishment of a suitable test procedure for determining resistance to ground, amount of current flow, and corrosion of steel embedded in concrete. Appendix describes a study of the effect of electric current on concrete.

6-23. **Corrosion of Power Plant Equipment by Water and Steam. Part III.** R. C. Ulmer. *Power Plant Engineering*, v. 51, Jan. 1947, p. 108-109, 118.

Corrosion of steam lines, superheaters and condensate lines; corrosion tendencies of wet and dry steam; prevention of corrosion by oxidation. Testing for corrosion in condensate lines; methods for prevention of corrosion in condensate lines give consideration to use of alloys, proper design, use of chemicals and deaeration.

6-24. **Corrosion.** Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 39, Jan. 1947, p. 89A-90A.

Extent and importance of the corrosion problem.

6-25. **New Technique Combats Electrolysis.** R. B. Walter. *Oil Weekly*, v. 124, Feb. 3, 1947, p. 18-21.

A 15-ft. rod on which was strung an alternating series of copper and zinc plates, separated by brass spacers, is installed in corrosive wells in a position to make intimate contact with the oil being pumped. The casing and pump parts are protected against corrosion by the cell couples set up between the copper and the zinc. The "treater units" must be replaced occasionally, when the zinc plates are used up.

6-26. **Corrosion of Gas Appliances.** *Gas Journal*, v. 249, Jan. 8, 1947, p. 96-98, 101.

Discussion of paper by N. Booth and others, published in the Dec. 11 and 18, 1946, issues.

6-27. **Anodic Corrosion of Brass.** J. M. Bialosky. *Corrosion and Material Protection*, v. 4, Jan-Feb. 1947, p. 15-16.

Series of experiments performed using muntz metal, naval brass, arsenical muntz and arsenical naval brass with applied anodic current in various aqueous solutions at room temperature to determine the dezincification characteristics of these alloys. Results indicate that arsenical muntz and arsenical naval brass resist this type of attack and naval brass is more resistant than muntz metal under the conditions explored. Initial dezincification occurs in the beta phase and attack of the alpha phase follows. Dezincification reaction produced in tests must have been due to selective attack of the zinc rather than to the redeposition of copper, which would not plate out on the anode of the cells.

6-28. **The Corrosion of Metals. Part VI. (Continued.)** *Sheet Metal Industries*, v. 24, Jan. 1947, p. 145-151, 153.

Corrosion of copper and its alloys. Resistance of copper-nickel alloys to sea water and marine atmospheres. Effect of high water velocity. Antifouling characteristics, corrosion fatigue, corrosion by steam and condensate of high copper alloys. Effects of oxygen and stress. Effects of various compositions. (To be continued.)

6-29. **Corrosion Resistance of 27% Chromium Alloy Recorded High in Plant Service Tests.** *Petroleum Processing*, v. 2, Feb. 1947, p. 116-117, 119, 122.

Suggestions for more effective commercial use of 27% chromium-iron alloy by petroleum refiners are given in a report based on 30 metallurgical studies made by several oil companies and the Babcock & Wilcox Tube Co., for the Office of Rubber Reserve. Recommendations for welding and a study of relative behavior and suitability of the alloy for use in catalytic dehydrogenation processes.

6-30. **The Electrochemistry of Corrosion Fatigue.** U. R. Evans. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 8*, Dec. 1946, 7 p.

Recent fundamental work on corrosion fatigue and methods of prevention. The mechanism of stressless corrosion has been quantitatively established by four independent methods. Suggests a mechanism based on the new experimental results.

6-31. **Corrosion.** Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 39, Feb. 1947, p. 83A-84A.

Economics of materials for chemical plant construction and desirability of standardizing means of expressing corrosion resistance of materials. Recommends adoption of "mils per year".

6-32. **Cathodic Protection of Pipe Lines.** E. C. Rogness. *Water & Sewage Works*, v. 94, Jan. 1947, p. 11-13.

Maintenance history of an 8.25-mile, 28-in., riveted steel pipe line, before and after installation of cathodic protection. Partial failure of the system

after three years operation led to investigation which resulted in certain changes in the design of the system.

6-33. Corrosion—the Great Destroyer. D. J. Fergus. *Corrosion*, v. 3, Feb. 1947, p. 55-66.

Use of magnesium and magnesium alloy rods for anodic protection of hot water tanks. Comparison of this system with ordinary galvanizing is shown by photographs.

6-34. Use of Sodium Chromate as a Corrosion Control Medium in Gas Condensate Wells. C. K. Eilerts, H. A. Carlson, R. V. Smith, F. G. Archer and V. L. Barr. *Corrosion*, v. 3, Feb. 1947, p. 73-74.

Bureau of Mines research to aid in prevention of corrosion in gas condensate wells has featured two approaches: (1) a search for an inhibitor, and (2) the testing of alloys to find one which would resist this type of corrosion. Among inhibitors, sodium chromate produced the best results.

6-35. Construction and Ratings of Copper Oxide Rectifiers for Cathodic Protection of Pipe Lines. L. W. Burton and C E. Hamann. *Corrosion*, v. 3, Feb. 1947, p 75-95.

Operating and application characteristics of the copper oxide cell and the use of copper oxide rectifiers for the prevention of corrosion on pipe lines and similar installations.

6-36. Corrosion Prevention and Protection. F. R. Morral. *Wire and Wire Products*, v. 22, Feb. 1947, p. 133-138, 175.

Various types of corrosion; methods of corrosion testing; corrosion protection; unit operations for coating processes.

6-37. Unusual Cause and Effect of Corrosion. A. H. Stuart. *Petroleum*, v. 10, Feb. 1947, p. 26, 31.

The packing of a centrifugal water pump developed a leak. The graphite impregnated asbestos packing was found to be deteriorated and to contain ferric hydroxide flakes. These were traced to an iron content of over 6% in the natural graphite used. A micaceous hematite, which had been submitted as a graphite substitute, was found to have no lubricating properties.

6-38. Steam Turbine Lubrication Problems and Their Solution. Part 3. Alan Wolf. *Petroleum*, v. 10, Feb. 1947, p. 30-31.

The cooling function of the oil; tube-corrosion problems; use of rust inhibitors. (To be continued.)

6-39. Cathodic Protection. C. H. McRaven. *Petroleum Engineer*, v. 18, Feb. 1947, p. 148, 150, 152, 154.

Theory and technique in pipe-line protection.

6-40. Reactions With Steel of Compounds Containing Chemical Groups Used in Lubricant Additives. Allen S. Powell. *National Advisory Committee for Aeronautics Technical Note No. 1207*, Feb. 1947, 13 p.

Reactions between steel of a type used in aircraft engine cylinder barrels and compounds containing reactive groups commonly found in lubricant additives. Products formed by reaction at temperatures from 400 to 650° F. were analyzed by reflection electron diffraction.

6-41. Corrosion Resistance of Steel and Cast Iron. A. W. Spitz. *Chemical Engineering*, v. 54, Feb. 1946, p. 135.

Data for cast iron and "ordinary" steel in contact with about 60 common chemicals are given to supplement Nov. 1946 report, which largely skipped these common materials.

6-42. Wet and Dry Chlorine Vs. Materials of Chemical Plant Construction. *Chemical Engineering*, v. 54, Feb. 1946, p. 219-220, 222, 224, 226, 228, 230, 232, 234.

Part II of a three-part symposium in which representative materials are evaluated for services involving wet and dry chlorine and chlorine water. Materials covered are vitreous silica; Worthite; tantalum; silicones; rubber lining; glass-lined steel; carbon and graphite; Hastelloy; and wood.

6-43. A Note on the Selective Corrosion of Phosphor Bronze in Hot-Water Service. W. D. Clark. *Journal of the Institute of Metals*, v. 73, Jan. 1947, p. 263-271.

Phosphor bronze pump impellers handling hot feedwater and condensate on a power station suffered an attack analogous to dezincification. Micrographic, analytical, and X-ray evidence of the nature and products of the attack. Very great difference has been noted between the damage done to two surfaces of the same piece of metal, that at a machined surface being greater than that at as-cast surface. This has resulted from having exposed the pores in the metal to ingress of liquid, and attack throughout their depth. Had neither surface been machined or had the metal been free from appreciable porosity, the amount of attack would not have been very important. On the as-cast surface the attack progressed in a complex manner leaving a number of lamellar residues.

6-44. Marine Exposure Tests on Stainless Steel Sheet. Willard Mutchler. *National Advisory Committee for Aeronautics Technical Note No. 1095*, Feb. 1947, 26 p.

Corrosion tests of stainless steel sheets included in the marine exposure programs from 1938 to 1945.

6-45. Intergranular Corrosion Determination. H. Kirtchik. *Iron Age,* v. 159, March 6, 1947, p. 67-70.

Development of a cyclic test for measuring intergranular corrosion in aircraft materials caused by gasoline containing lead halides. In an effort to evaluate the factors responsible for failures of supercharger nozzle boxes, several types of stainless steels and Inconel were subjected to a laboratory duplication of actual corrosion conditions.

6-46. Designing to Prevent Corrosion. R. B. Mears and R. H. Brown. *Corrosion,* v. 3, March 1947, p. 97-118; discussion, p. 119-120.

Mechanisms of different types of corrosion and how to minimize it by proper selection of metals and of unions between dissimilar metals, by covering the joints in different ways, by cathodic means, and by use of inhibitors. 19 ref.

6-47. Results of Some Studies of the Condensate Well Corrosion Problem. Walter F. Rogers and Harry E. Waldrip. *Corrosion,* v. 3, March 1947, p. 121-138; discussion, p. 138-140.

The wetting power of condensates and waters for steel in the presence of each other, with and without wetting agents. Effect on the corrosion rate of the mixture studied by laboratory methods and extended to field operations.

6-48. Discussion of Paper on Chemical Corrosion Resistance of Lead. H. H. Uhlig. *Corrosion,* v. 3, March 1947, p. 149-150.

Lead or lead alloys should not be used in equipment coming in contact with food and beverages because of the toxicity of lead corrosion products. This point was not mentioned in "Chemical Corrosion Resistance of Lead" published in the December 1946 issue.

6-49. The Mechanism of Oxidation and Tarnishing. U. R. Evans. *Electrochemical Society Preprint 91-5,* 1947, 23 p.

The thickening of oxide films can occur in different ways. Rectilinear, logarithmic, and parabolic equations represent the different rate processes involved; types of deterioration (flaking, shear-cracking) associated with each form. The theory is applied to interpret the results of Vernon and others, and particularly to explain why conditions prevailing when a specimen is first exposed decide the corrosion rate, which often continues unchanged even if conditions change later on.

6-50. The Mechanism of Corrosion Fatigue of Mild Steel. U. R. Evans and M. Tchorabdji Simbad. *Proceedings of the Royal Society,* v. 188, Feb. 11, 1947, p 372-391.

Investigation by chemical and electrochemical methods, in an attempt to find out how to prevent it by cathodic methods. The application of cathodic current was found to prevent corrosion under certain conditions, the current strength required increasing with stress range. Three or four different factors are responsible for the enhancement of rate of corrosion and of mechanical damage by alternating stresses. 31 ref.

6-51. Corrosion Resistance of Magnesium and AZ80X Magnesium Alloy Castings Containing Small Proportions of Silver and Lead. R. R. Rogers and W. Dingley. *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 50, Feb. 1947, p. 49-56. (Bound with *Canadian Mining and Metallurgical Bulletin.*)

Accelerated chloride corrosion tests on AZ80X magnesium alloy castings with and without silver or lead additions. A similar series of alloys in which silver or lead was added to commercially pure magnesium was tested for comparison. The addition of 0.1% lead, or 0.05% lead +0.05% silver—particularly the former—increased the corrosion resistance to aqueous salt solutions considerably.

6-52. Review of Corrosion Literature for 1945. *Transactions of the Electrochemical Society,* v. 89, 1946, p. 41-74.

16 sections by specialists in respective subdivisions of the field. Most of the sections have references at the end, but a few consist of compilations of abstracts of the literature.

6-53. Nonferrous Pipe Minimizes Sludge Plant Corrosion. *Petroleum Refiner,* v. 26, March 1947, p. 138.

Applications of bronze and copper pipe and fittings for handling sludge in new plant of Union Oil Co.

6-54. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 39, March 1947, p. 91-A-92-A.

The prevention of corrosion caused by fluorine and by hydrofluoric acid.

6-55. Corrosion Protection Lengthens Life of Aluminum Transportation Units. J. F. Mason. *Aluminum and Magnesium,* v. 3, Feb. 1947, p. 14-15, 17, 21.

Precautions to be observed in selecting materials, and design of units. Various protective measures.

6-56. Remedies Studied for Freakish Corrosion Occurring in Some Condensate Fields. D. P. Thornton, Jr. *Petroleum Processing,* v. 2, April 1947, p. 273, 275, 276, 279.

Three years' study of the cause of the spotty attacks of corrosion experienced in gas-condensate fields indicates that lower fatty acids found in well fluids in minute concentrations

are principal promoting agents. Various types of chemical inhibitors are being tried with varying degrees of relief. Plastics or other forms of coating are also being investigated.

6-57. The Corrosion of Metals; An Economic Problem Ready for Science. Parts I and II. Hugh J. McDonald. *Illinois Tech Engineer,* v. 12, Dec. 1946, p. 8-11, 29-30, 32, 34, 36; March 1947, p. 13-17, 56, 58.

In Part I, the fundamental principles of corrosion are reviewed, including the various causes of corrosion—those inherent in the nature of the metal and its immediate environment, and external factors. In Part II, the controlling factors in corrosion and its prevention are discussed in more detail. These include: polarization and overvoltage, anodic and cathodic control, use of inhibitors, surface-conversion coatings, corrosion inhibiting paints, and stress-corrosion cracking and fatigue. Finally, a few useful home and shop corrosion prevention "recipes" are given, and the need for further research is emphasized.

6-58. The Corrosion of Water Heaters. Part I. Experiments With Instantaneous Water Heaters. N. Booth, P. C. Davidge, G. H. Fuidge, and B. Pleasance. *Gas Research Board (London), Communication GRB27,* 28 p.

Two standard models of instantaneous sink water heaters were subjected to investigation in an accelerated life test. In both cases heater and fins were constructed of "tinned" copper. At the end of each series of 1200 heating operations, the corrosion deposit was removed from the heater for weighing and analysis. The main factor investigated was the sulphur content of the gas. Minimum corrosion was found to occur when using a gas containing approximately 3 grains per 100 cu.ft.

6-59. Wet and Dry Chlorine Vs. Materials of Chemical Plant Construction. (Concluded.) *Chemical Engineering,* v. 54, March 1947, p. 213-214, 216, 218, 220.

Short articles on Durimet and Chlorimet; nickel and nickel alloys; and chemical stoneware.

6-60. Summary of Research on Drill Stem Performance. Thomas J. Young. *Drilling Contractor,* v. 3, Feb. 15, 1947, p 47-49.

From five reports of Battelle Memorial Institute to the Assoc. of Oilwell Drilling Contractors.

6-61. Corrosion Control. Claudius Nielsen. *Organic Finishing,* v. 8, March 1947, p. 19-29.

Different processes metal is subjected to in surface conditioning for fabrication or for the final finish. Evaluates each in relation to corrosion control.

6-62. The Effect of Small Lead and Silver Additions on the Corrosion Resistance of Castings of Magnesium and Certain of Its Alloys at Elevated Temperature and High Humidity. R. R. Rogers and W. Dingley. *Electrochemical Society Preprint 91-13,* 1947, 9 p.

Corrosion resistances of commercially pure magnesium, and the AZ80x, AZ63x, and M1 magnesium alloys, with and without small silver, lead, or silver-lead additions, in air at 204° F. and high relative humidity It was found that the average corrosion rate of these materials may be considerably decreased by the addition of 1% silver. Other additions studied also produce a considerable decrease. These additions do not increase the specific gravity of the metals to a great extent.

6-63. Some Experiments on Corrosion of Steel by Boiling Water. A. J. Gould and U. R. Evans. *Journal of the Iron and Steel Institute,* v. 155, Feb. 1947, p. 195-200.

Behavior of steel in boiling water is determined largely by the position of the formation of solid corrosion products. Under anaerobic conditions, steel reacts at first with water, eliminating hydrogen, but a film is formed over the surface so that the attack over long periods is very slight. In presence of oxygen the conversion of ferrous hydroxide to magnetite, or rust, appears to take place to some extent at a distance from the metal, so that the film is discontinuous and serious corrosion occurs. Salts tend to increase and sodium hydroxide to diminish the attack under aerobic conditions. Copper deposited on part of the steel increases the intensity of attack in short experiments but not in long ones.

6-64. External Deposits on Boiler Heating Surfaces. *Combustion,* v. 18, March 1947, p. 26-28.

A digest of a report issued by the British Boiler Availability Committee covering an investigation of the form and composition of deposits in a large number of boilers examined. The mechanism of deposit formation and the behavior of sulphates, bisulphates, phosphates and chlorides, particularly chemical changes taking place in the vapor phase.

6-65. Internal Corrosion of Furnace Tubes of High-Pressure Boilers. Richard C. Corey. *Combustion,* v. 18, March 1947, p. 39-42.

Experiences with internal tube corrosion at Springdale and Firestone, which were reviewed in the December 1946 issue.

6-66. Use of Corrosion Inhibitors in Products Pipelines—A Survey of Practices. Ivy M. Parker. *Corrosion,* v. 3, April 1947, p. 157-168.

Survey of practice in 20 companies operating products pipelines. 11 ref.

6-67. Cathodic Protection Rectifiers. W. L. Roush and E. I. Wood. *Corrosion*, v. 3, April 1947, p. 169-172.

Wind chargers and engine generator sets and air and fan-cooled rectifiers.

6-68. The Role of Algae in Corrosion. Henry C. Myers. *Journal of the American Water Works Association*, v. 39, April 1947, p. 322-324.

Describes corrosion due to algae which occurred in open steel tanks belonging to the California Water & Telephone Co., in Southern California. The theory of this type of corrosion and attempts to control it. Covering the tanks to cut out the sunlight proved to be the least expensive and most effective control method.

6-69. Corrosion Causes Most Cylinder Wear. *SAE Journal*, v. 55, April 1947, p. 62.

Test setup and conclusions. (Digest of "Minute Amounts of Cylinder Wear Are Measured with a Microscope", by Clarence S. Bruce and Jesse T. Duck.)

6-70. Protecting Pipe in Open Systems. M. D. Appleman. *American Gas Association Monthly*, v. 29, April 1947, p. 194-196.

How anaerobic corrosion may be eliminated through the application of basic principles familiar to soil bacteriologists, soil chemists, and soil physicists; promising directions for future research. 25 ref.

6-71. Magnesium Anodes Protect Cable Sheath. R. L. Featherly. *Electric Light and Power*, v. 25, April 1947, p. 78-82.

A comprehensive analysis of the cable corrosion problem, together with a detailed report of results obtained on several installations of magnesium anodes for cable protection.

6-72. Insulation of Dissimilar Faying Metal Surfaces. B. W. Floresch. *Western Metals*, v. 5, April 1947, p. 22-23.

Tests to determine the optimum organic insulation necessary for protection against galvanic corrosion in various dissimilar-metal contacts. Tests are not correlated with actual service conditions but are designed to show the comparative corrosion resistance of definite dissimilar-metal contacts having various finishing schemes.

6-73. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 39, April 1947, p. 81A-82A.

Corrosion is classified into eight different forms based on appearance of the corroded metal. A few types are illustrated.

6-74. Glossary of Corrosion Terms. *Chemical Industries*, v. 60, April 1947, p 618-620.

Glossary prepared for inclusion in the forthcoming Corrosion Handbook, sponsored by the Electrochemical Society and to be published by John Wiley & Sons.

6-75. Nouvelles Recherches sur l'Oxydation du Fer aux Temperatures Elevées par la Méthode Micrographique. (New Research on the High-Temperature Oxidation of Iron by Micrographic Methods.) J. Benard and O. Coquelle. *Revue de Métallurgie*, v. 43, March-April 1946, p. 113-124.

Thorough X-ray investigation of a large number of test specimens permitted establishment of the dependence of iron oxide growth and structure on the temperature and nature of the alloying elements. 10 ref.

6-76. Recherches sur la Corrosion en Angleterre et aux Etats-Unis Pendant la Guerre (1940-1945). (Research on Corrosion in England and U.S.A. During the War—1940-1945.) E. Herzog. *Métaux et Corrosion*, v. 21, July 1946, p. 92-100.

A review.

6-77. Use of Corrosion Inhibitors in Products Pipe Lines. Ivy M. Parker *Proceedings American Petroleum Institute*, v. 26, section V, 1946, p. 26-36.

Results of a survey of 19 companies 12 ref.

6-78. The Mechanism of the Sulphide Corrosion of Iron. P. V. Geld and O. A. Esin. *Journal of Applied Chemistry (U.S.S.R.)*, v. 19, no. 7, 1946, p. 678-683. (In Russian.)

Comparison between experimental data for sulphide and for oxide corrosion of iron revealed certain similarities. The main difference seems to be that the concentration of components in the lattice structure of the iron-sulphur system varies over a larger range than in the iron-oxygen system.

6-79. Regularities in the Action of Organic Acids. V. D. Iakhontov. *Journal of Applied Chemistry (U.S.S.R.)*, v. 19, no. 8, 1946, p. 761-772. (In Russian.)

An investigation of the actions of a number of organic acids on steel, lead, tin, copper, and aluminum resulted in the observation of certain regularities in their behavior, especially in connection with dissociation constants and concentrations of acids, temperatures, and times of action.

6-80. Corrosion and Oxidation Experiences in High-Pressure and High-Temperature Steam Service. Paul M. Brister and J. B. Romer. *Electrochemical Society Preprint 91-17*, 1947, 23 p.

Corrosion experienced with metals used for steam-generating tubes and superheater tubes for high-pressure boilers. Methods of relief and interpretation of the causes of corrosion of steam-generating tubes. For high

temperature superheater tubes, it is shown how temperature shock affects the rate of corrosion on the steam side and the gas side of the tube.

6-81. High-Temperature Corrosion of Metals Under Alternate Carburization and Oxidation. Harry K. Ihrig. *Electrochemical Society Preprint 91-23*, 1947, 11 p.

Laboratory and extensive pilot and large commercial plant tests. From the evidence presented, it is believed that the high chromium steels, such as 26% Cr, are the best for this service. The protective action of small amounts of sulphur in the feed stock.

6-82. The Oxidation of Metals. W. E. Campbell and U. B. Thomas. *Electrochemical Society Preprint 91-24*, 1947, 16 p.

A simple method for measuring low oxidation rates at elevated temperatures. Oxidation rate of copper is measured in pure oxygen at five temperatures from 100 to 256° C. Annealed copper oxidizes more rapidly than unannealed copper at 169° C., an effect which is believed to be due to an increase in specific surface due to recrystallization in annealing. The oxidation-rate curves for a large number of copper alloys, nickel, and stainless steel are presented at 194, 256, and 302° C.

6-83. Resistance a la Corrosion des Assemblages d'Aluminum Soudés par Points. (Corrosion Resistance of Spot Welded Aluminum Assemblies.) Nicolas Beliaeff. *Revue de l'Aluminium*, v. 24, Jan. 1947, p. 3-9.

A series of corrosion tests (alternate immersion in salty atmospheres at room temperature and at 40° C. and long-time tests in sea water) on spot welded aluminum alloys having a protective coating of paint, oxide, or pure aluminum plating.

6-84. L'Emploi de la Laine de Verre pour L'Isolement Thermique d'Appareils en Alliages Légers. (The Use of Glass Wool as Thermal Insulation in Light-Alloy Apparatus.) Jean Herenguel. *Revue de l'Aluminium*, v. 24, Jan. 1947, p. 10-11.

In investigation of corrosion of a double-walled electric boiler made of an aluminum-magnesium alloy having glass-wool insulation between the walls it was found that alkalinity of the insulating material and the presence of water should be avoided in order to eliminate corrosion at temperatures above 100° C.

6-85. Der Chemische und Anstrichtechnische Korrosionsschutz des Magnesiums. (Surface Corrosion Protection of Magnesium by Means of Chemical Reactions and by Coating With Protective Materials.) Hellmuth Weis. *Mitteilungen des Chemischen Forschungsinstitutes der Industrie Osterreichs*, v. 1, Feb. 1947, p. 42-44.

Comparison of the resistance to corrosion of a magnesium surface after chemical or electrolytic treatment with that of one coated with protective substances such as paints, varnishes, resins.

6-86. The Corrosion of Iron and Steel and Its Prevention. J. C. Hudson. *Journal of the Oil & Colour Chemists' Association*, v. 30, Feb. 1947, p. 35-49; discussion, p. 49-52.

Based largely on the experimental findings of the Corrosion Committee of the Iron and Steel Institute and the British Iron and Steel Research Association. Particular attention paid to atmospheric corrosion.

6-87. Measurement of Corrosion Pits in Boiler Tubes. B. M. Thornton. *Engineering*, v. 163, March 28, 1947, p. 229-230.

A tool designed to detect and measure corrosion pits using an electrical instrument previously described for measuring the thickness of boiler tubes in place, and of nonferrous castings. A new exploring head was designed by means of which the location and presence of serious pitting is detected. One man moves the head steadily through the tube, while another watches the micro-ammeter.

6-88. The Corrosion of Metals. Part VII. (Continued.) *Sheet Metal Industries*, v. 24, April 1947, p. 801-806.

The corrosion of zinc sheet and of the die-casting alloys.

6-89. The Use of Alloys for Imparting Corrosion Resistance to Iron and Steel. E. A. Tice. *Steel Processing*, v. 33, April 1947, p. 211-215.

Effects of copper, phosphorus, silicon, nickel, chromium, molybdenum, columbium and titanium; proprietary low-alloy, high-strength steels; seawater, natural water, and soil corrosion.

6-90. Novel Ground Bed for Cathodic Protection. Tom R. Statham. *Petroleum Engineer*, v. 18, April 1947, p. 53-54.

Installation for protection of three 8-in. and one 10-in. pipe line in an extremely corrosive area near Corsicana, Texas. Two drill cables doped with insulating material were placed in a ditch parallel to and 250 ft. away from the pipe lines. 20-ft. pipe lengths were welded to the drill cables at intervals determined by soil-resistance measurements. Seventeen 8-volt, 20-amp. rectifiers were installed on the 4-mile stretch. In four years of operation, no corrosion leaks have occurred.

6-91. Electron Diffraction Study of Oxide Films Formed on Molybdenum, Tung-

sten, and Alloys of Molybdenum, Tungsten and Nickel. J. W. Hickman and E. A. Gulbransen. *Metals Technology,* v. 14, April 1947, T. P. 2144, 17 p.

Survey of the literature. Study of existence diagrams of the oxides occurring on molybdenum and tungsten; existence diagrams of the oxides occurring on the alloys 80% Mo, 20% W; 93% Mo, 7% Ni; 93% W, 7% Ni; and effects of heating and cooling the oxides that form on these metals and alloys. 22 ref.

6-92. **Weathering Effects on Magnesium Coatings.** Loring R. Williams and George W. Sears. *Light Metal Age,* v. 5, April 1947, p. 10-11, 22.

Studies were carried out in western Nevada because of its altitude, extent of sunshine, and wide daily temperature range. Sheet magnesium and surface coatings were of commercial grade. Approximate composition was 3.5% aluminum, 0.1% manganese, 1.3% zinc, and 95.1% magnesium. Preparation of test plates; weathering tests; observations made during the weathering period and observations made at the end of test.

6-93. **Hydrogen Peroxide. Structural Materials, Manufacture and Uses.** J. S. Reichert and R. H. Pete. *Chemical Engineering,* v. 54, April 1947, p. 213-214, 216, 218, 220, 222, 224, 226, 228.

The fitness of various materials from the standpoint of corrosion resistance and activity as catalyzers of peroxide decomposition. Stabilizers suggested for certain cases. Manufacturing methods and applications.

6-94. **Facts and Factors of Boiler Corrosion.** K. R. Hodges. *Industry and Power,* v. 52, May 1947, p. 88-89.

Effects of overheating as well as chemical, electrochemical, and galvanic action that cause common corrosion difficulties.

6-95. **Is Corrosion Taking $ $ From Your Pocket?** Bradford J. Cotey. *Oil and Gas Journal,* v. 46, May 10, 1947, p. 68, 71, 92-93.

Beneficial results of using the chemical inhibitor made by Turco Products, Inc., to prevent oil-well corrosion.

6-96. **Mechanism of Protective Action of Alloying Elements During the Sulphide Corrosion of Iron.** P. V. Geld and O. A. Essin. *Journal of Applied Chemistry (U.S.S.R.),* v. 19, no. 9, 1946, p. 861-868. (In Russian.)

A new interpretation of the mechanism of the protective action of alloying elements vs. sulphur corrosion by which the protective action of chromium and aluminum and the absence of such action in the case of nickel and manganese may be explained. 17 ref.

6-97. **Azione Inibitrice del Cromato Sodico e del Permanganato Potassico Nell'Attacco dell'Alluminio in Soluzioni Dilute di Idrato Sodico, a Diverse Temperatures. (Inhibiting Action of Sodium Chromate and Potassium Permanganate on Attack on Aluminum by a Dilute Solution of Sodium Hydroxide, at Various Temperatures.)** Nello Collari. *Alluminio,* v. 15, Jan-Feb. 1947, p. 13-21.

Sodium chromate and potassium permanganate inhibit attack on 99.5 aluminum immersed in a 0.5 to 1% solution of NaOH at 20 to 50° C., by forming protective oxide layers on the aluminum. While the degree of effectiveness varies with the temperature, in general, potassium permanganate is the more effective agent.

6-98. **Vertical Turbine Pumps.** T. E. Larson. *Water & Sewage Works,* v. 94, April 1947, p. 117-121.

Pump corrosion as caused by galvanic action, carbon dioxide, and stray currents; prevention methods.

6-99. **Das Korrosionsverhalten des Aluminiums als Werkstoff in der Chemischen Industrie. (Corrosion Resistance of Aluminum as a Material in the Chemical Industry.)** E. Zurbrugg. *Chimia,* v. 1, April 1947, p. 74-76.

The properties of aluminum which make it suitable as a material for chemical apparatus. The effect of impurities and alloying elements in increasing or decreasing corrosion resistance.

6-100. **Sheet Pile Corrosion at Port of Copenhagen.** Mogens Blach and Axel Rogberg. *Engineer,* v. 183, April 25, 1947, p. 348-350.

Results from an extensive study of corrosion of steel-sheet piles. Measurements were made both of the reduced thicknesses of actual piles, and of the reduced weights of test specimens immersed for periods as long as 21 years. Economics of using thicker sheet.

6-101. **Corrosion on Gasworks.** A. J. Brandram. *Arrow Press Technical Publications,* no 10, 1947, p. 2-13; discussion, p. 13-15. (Supplement to *Gas Times,* v. 51, April 26, 1947.)

An extensive discussion of the atmospheric corrosion of the various iron and steel structures in manufactured-gas establishments. Includes both the theoretical and the practical side, giving results of experimental work on corrosion of various metals, as obtained from the literature. Methods of prevention of corrosion.

6-102. **Cathodic Protection.** H. H. Anderson. *Railway Signaling,* v. 40, May 1947, p. 306-308.

A simplified explanation of the corrosion of metals in the soil, and of cathodic protection.

6-103. **Atmospheric Corrosion of Iron and Steel.** Frederick C. Strong. *Monthly*

Review, v. 34, May 1947, p. 551-556.
Definitions of corrosion terms. The mechanism of corrosion by moist air and by atmospheric impurities. Protection of iron and steel. 12 ref.

6-104. Materials in Boiler Feed-Pump Construction. H. L. Ross. *Combustion,* v. 18, April 1947, p. 43-44.
Influence of various factors on corrosion-erosion when employing carbon steel.

6-105. Corrosion-Erosion of Boiler Feed Pumps and Regulating Valves. H. A. Wagner, J. M. Decker and J. C. Marsh. *Transactions of the American Society of Mechanical Engineers,* v. 69, May 1947, p. 389-397; discussion, p. 397-403.
Seven 500-hr. corrosion-erosion tests, involving 18 different materials, were conducted at the Marysville power plant of the Detroit Edison Co. to determine resistance to attack in boiler feed pumps and regulating valves. Five tests indicated that resistance to corrosion-erosion is materially increased by using chromium-bearing alloy steels. Bronzes and monel are resistant and, to a lesser extent, cast iron. Results obtained with a bakelite lacquer-coated carbon steel indicated considerable promise for boiler feed pumps having cast steel casings.

6-106. Investigation of Acid Attack on Boilers and the Effect of Repeated Acid Cleaning on the Metal. H. C. Farmer. *Transactions of the American Society of Mechanical Engineers,* v. 69, May 1947, p. 405-411; discussion, p. 411-412.
Investigation shows that stressed metal is more readily attacked by inhibited acid than stress-relieved metal. With a knowledge of the controlling factors, such as temperature, acid strength, and contact time, the operator can acid-clean boilers with a reasonable assurance that corrosion or metal attack will be reduced to a minimum.

6-107. Corrosion in Storage Tanks for Crude Sulphate Turpentine. S. G. Norton, Gordon E. Lowe, and George M. Calhoun. *Paper Trade Journal,* v. 124, May 1, 1947, p. 34-35.
Factors which promote corrosion and preventative recommendations. Tests were made by exposing various metals in the vapor above the liquid in a small storage tank. Stainless steel, Everdur, or nickel should be satisfactory construction materials. Copper, aluminum, or hot dipped galvanized tanks might be satisfactory, but should be tested under operating conditions.

6-108. Reactions of Magnesium and Aluminum With Iodine and With Concentrated Sulphuric Acid. Leon McColloch. *Journal of Chemical Education,* v. 24, 1947, p. 240.
Experiments show that magnesium forms a passivating film in iodine which protects it even up to 600° C., while aluminum reacts readily. In cold 98% H_2SO_4, films are formed on both metals, but the one on aluminum gives only partial protection.

6-109. Influence des Facteurs Cristallographiques sur la Corrosion Intergranulaire de l'Aluminium de Haute Purete. (Influence of Crystallographic Factors on the Intergranular Corrosion of High-purity Aluminum.) Paul Lacombe and Nicolas Yannaquis. *Comptes Rendus,* v. 22, March 1947, p. 921-922.
Intergranular corrosion of aluminum caused by attack of HCl is not reduced on increasing the purity of the aluminum from 99.95% to 99.9986% (0.0002% Fe, 0.0009% Si, and 0.0003% Cu). Results of investigation indicate that the corrosion is caused by differences in the orientation of adjacent networks rather than by the presence of impurities.

6-110. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 39, May 1947, p. 87A-88A.
Pitting and dezincification.

6-111. Acetic Acid and Chlorine Vs. Materials of Chemical Plant Construction. *Chemical Engineering,* v. 54. May 1947, p. 241-242, 244, 246, 248.
Series includes articles on Haveg (a plastic material); stainless steel; miscellaneous resinous coatings; and lead.

6-112. Corrosion Tests in Distillation Equipment. W. Z. Friend and J. F. Mason, Jr. *Petroleum Engineer,* v. 18, May 1947, p. 192, 194, 198, 201, 204.
Results obtained from a number of plant corrosion tests in atmospheric crude distillation and in the separation, fractionation, and stabilization of the primary products from thermal cracking. Spool-type specimen holder used.

6-113. Rate of Corrosion of Lead by Hydrocarbon Solutions of Organic Acids. David Turnbull and Delton R. Frey. *Journal of Physical and Colloid Chemistry,* v. 51, May 1947, p. 681-704.
Effect of acid structure and concentration upon the corrosion rate of lead in hydrocarbon solvents, using atmospheric air as oxidizing agent.

6-114. The Kinetics of Dissolution of Cadmium in Hydrochloric Acid. June F. Zimmerman and Hugh J. McDonald. *Journal of Physical and Colloid Chemistry,* v. 51, May 1947, p. 857-868.
Results of a laboratory investigation. 16 ref.

6-115. Materials and Finishes for Tropical Service. C. D. Cook and C. Merritt, Jr. *Materials & Methods,* v. 25, May 1947, p. 77-80.
Humidity-testing procedure. Results

of humidity and salt-spray tests on several metals with various types of surface finishes. The electrolytic behavior of certain materials.

6-116. Corrosion Coupons and Pipe Life Predictions—Revision of 1947. W. R. Schneider. *Corrosion*, v. 3, May 1947, p. 209-220.

Details of the procedures followed by Pacific Gas & Electric Co. in the use of coupons to evaluate corrosive conditions along their pipe lines. Results of their use over a ten-year period, showing the effects of various factors and correlations between actual pipe life and that predicted by analysis of coupon data.

6-117. Protective Coatings on Bell System Cables. V. J. Albano and Robert Pope. *Corrosion*, v. 3, May 1947, p. 221-226.

Development of various types of metal, plastic, and fabric coatings, and combinations of these materials, for protection of buried lead-covered telephone cables. (Presented at North East Regional Meeting of N.A.C.E., New York, Oct. 24, 1946.)

6-118. Anaerobic Corrosion of Iron in Soil. R. L. Starkey and K. M. Wight. *Corrosion*, v. 3, May 1947, p. 227-232.

The bacteria causing the corrosion; mechanism of the process; detection of the corrosion during early stages; effect of seasonal changes; resistance of pipe-wrapping materials to anaerobic corrosion. (Condensed from Report of Distribution Committee of A.G.A., 1945.)

6-119. A Study of the Corrosion of Copper Alloy Condenser Tubes. N. W. Mitchell. *Corrosion*, v. 3, May 1947, p. 243-251.

Some hitherto unpublished data derived from field corrosion tests, and the present state of our knowledge of the corrosion of copper alloy condenser tubes in refinery and gasoline-plant service. (Presented at A.S.M.E. meeting, Tulsa, Okla., Oct. 7 to 9, 1946.)

6-120. Mechanical and Metallurgical Control of Sulphuric Acid Corrosion in Petroleum Processes. E. R. Wilkinson. *Corrosion*, v. 3, May 1947, p. 252-262.

Basic factors which influence the degree of sulphuric acid corrosion; some of the mechanical and metallurgical means for affecting systematic control. (Presented at the A.S.M.E. meeting in Tulsa, Okla., Oct. 7 to 9, 1946.)

6-121. Galvanic Aluminum Anodes for Cathodic Protection. R. B. Hoxeng, E. D Verink, and R. H. Brown. *Corrosion*, v. 3, June 1947, p. 263-274.

Progress made in the development of galvanic aluminum anodes and service data on their use for the cathodic protection of underground steel structures. 10 ref. (Presented at Annual Meeting of National Association of Corrosion Engineers, Chicago, April 7 to 10, 1947.)

6-122. Corrosion and Preventive Methods in the Katy Field. R. C. Buchan. *Corrosion*, v. 3, June 1947, p. 275-290.

Use of plastic-coated steel and use of a neutralizing agent have been found helpful. The chemicals tried as inhibitors were unsatisfactory. Others are being tried. (Presented to Division of Production, American Petroleum Institute, Chicago, Nov. 13, 1946.)

6-123. Corrosion of Refinery Equipment —A Review. E. E. Kerns. *Corrosion*, v. 3, June 1947, p. 291-294.

Effects of the crude; hydrogen sulphide and mercaptan sulphur; total chloride content (total salt); total sulphur; neutralization. (Presented at A.S.M.E. meeting, Tulsa, Okla., Oct. 1946.)

6-124. Discussion of Paper on Designing to Prevent Corrosion. F. N. Speller. *Corrosion*, v. 3, June 1947, p. 299-300.

Discussion of paper by Mears and Brown, in March issue. Importance of cleanliness as a factor in promoting uniformity of attack.

6-125. Attenuation of Drainage Effects on a Long Uniform Structure With Distributed Drainage. J. M. Standring. *Corrosion*, v. 3, June 1947, p. 301-309.

A mathematical development. (Paper presented at meeting of National Association of Corrosion Engineers, Chicago, April 7 to 10, 1947.)

6-126. Combatting Corrosion by Rust. Joseph Kalmer. *Canadian Metals & Metallurgical Industries*, v. 10, May 1947, p. 38, 40.

The cost of rust in underground pipes. How rusting occurs. Bacteria which cause rust. (Research work being done by British scientists.)

6-127. Corrosion of Filters in Sugar Refineries. Part I. H. Inglesent and J. Anderson Storrow. *Industrial Chemist*, v. 23, May 1947, p. 291-297.

Results of investigations using plant liquors. Losses due to contamination; selection of materials; behavior of different alloys; corrosion with glucose liquors.

6-128. Corrosion Resisting Steel for Marine Conditions. *British Steelmaker*, v. 13, May 1947, p. 258.

Results of exposure tests on a copper-bearing steel made by a British firm.

6-129. A Study of the Cause of Hard Slag Deposits on Firesides of Naval Boilers. L. C. McCloskey. *Journal of the American Society of Naval Engineers*, v. 59, May 1947, p. 146-164.

A study of a type of deposit on su-

perheating tubes which has caused much trouble in the Navy. The chemical and physical nature of the deposits; fuel and boiler design characteristics; burner design; theoretical considerations concerning atomization and behavior of small particles in gas streams and films; the probable sequence of events in slag formation; the cause of slagging; means for reducing the incidence of slag formation; and methods for removal of deposits.

6-130. Cast Alloys Stabilized With Columbium or Titanium. E. A. Schoefer. *Alloy Casting Bulletin,* May 1947, p. 1-7.

The influence on corrosion resistance of columbium and titanium additions to CF-type chromium-nickel alloys, given in report submitted to Alloy Casting Institute by Battelle Memorial Institute.

6-131. Estimation of Scaling Resistance. Howard S. Avery. *Alloy Casting Bulletin,* May 1947, p. 9-12.

Nomographs prepared by Battelle Memorial Institute for use in estimating the approximate corrosion resistance of iron-nickel-chromium alloys to oxidizing or reducing (flue-gas) atmospheres at elevated temperatures.

6-132. Corrosion Processes. (Concluded.) U. R. Evans. *Metal Industry,* v. 70, May 16, 1947, p. 355-357.

Review of British work. 40 ref.

6-133. Use of Glycerine in Metal Protection. Georgia Leffingwell and Milton A. Lesser. *Corrosion and Material Protection,* v. 4, May-June 1947, p. 12, 22.

A review. 43 ref.

6-134. Relation Between Corrosion Rate of Copper-Lead Bearing Alloys and Pure Lead in Solutions of Organic Acids in Hydrocarbons. Carl F. Prutton and David Turnbull. *Corrosion and Material Protection,* v. 4, May-June 1947, p. 13-18, 20.

Rate of corrosion of two types of copper-lead bearing alloys in air-saturated solutions of various organic acids in xylene and white oil. Several variables were controlled and evaluated. 10 ref.

6-135. Rust, Industry's Arch Enemy. Thomas Trail. *Power Plant Engineering,* v. 51, June 1947, p. 84-86.

Seriousness of rust in the life of industrial equipment; theory of rust; requirements of preservative coatings; use of colors to provide contrast between coats of protective coatings; preparation of surfaces preliminary to applying protective coatings; special treatment for galvanized iron; and paints for various surfaces.

6-136. New Theory for Corrosion of Carbon Steel. William C. Uhl. *Petroleum Processing,* v. 2, June 1947, p. 405-408.

Theory asserts that the structure of the carbide crystals in steels is the important factor controlling corrosion. Metal surface areas rich in lamellar pearlite are said to be more resistant than areas in which the carbide structure is in spheroidized form.

6-137. Corrosion Control With Calgon. Owen Rice. *Journal of the American Water Works Association,* v. 39, June 1947, p. 552-560.

The use and value of the above sodium phosphate glass for prevention of formation of calcium carbonate boiler scale, for corrosion control, for prevention of precipitation of dissolved iron and manganese, and for tuberculation control.

6-138. Corrosion Retarding of Aluminum Alloys. Rick Mansell. *Organic Finishing,* v. 8, May 1947, p. 25, 27-32.

(To be concluded.)

6-139. Cathodic Protection of Steel Tank Bottoms by the Use of Magnesium Anodes. J. R. James and R. L. Featherly. *Petroleum Technology,* v. 10, May 1947, T. P. 2202, 7 p.

Results obtained from tests and commercial installations on two 55,000-bbl. and two 20,000-bbl. tanks. Potential measurements taken a few months after completion of the installation indicated that the potential could be reduced and still provide adequate protection. Costs are calculated to be only 1% of the previous tank-bottom replacement costs.

6-140. Corrosion Processes. U. R. Evans. *Metal Industry,* v. 70, May 9, 1947, p. 335-337.

British contributions to their understanding. 38 ref. (To be concluded.)

6-141. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 39, June 1947, p. 87A-88A.

Resulting from a combination of corrosion and mechanical action, and means of evaluating test specimens for resistance to this type of deterioration. Effects of pH on rate of steel corrosion, and effect of copper in sulphuric acid slurry on erosion-corrosion of 18-8 S Mo stainless.

6-142. Corrosion Studies for the Petroleum Refining Industry. Part I. F. A. Rohrman. *Petroleum Refiner,* v. 26, June 1947, p. 85-90.

The economic aspects of corrosion and basic corrosion theory. (To be continued.)

6-143. Corrosion—in High-Pressure Gas-Condensate Wells—Gulf Coast Area. T. S. Zajac. *Oil and Gas Journal,* v. 46, June 28, 1947, p. 102-105, 107.

History, scope, causes, characteristics, cooperative work done by the industry, field methods of corrosion prevention, cost, and future work to be done on gas-condensate well corrosion.

6-144. Nature and Mechanism of Passivity of 18-8S Stainless Steel. M. G. Fontana and F. H. Beck. *Metal Progress*, v. 51, June 1947, p. 939-944.

First report from the research program on the fundamentals of corrosion sponsored by the Office of Naval Research at Ohio State University shows that a passivated surface of low-carbon 18-8 becomes active after exposure to vacuum, and again becomes passive by exposure to air, the action thus being reversible. Electron diffraction gives no indication of oxide layers on passivated surfaces. A physically adsorbed layer of weakly held gas molecules is believed responsible for the phenomenon.

6-145. Effect of Sulphur Bacteria on Corrosion. L. Liberthson. *Iron and Steel Engineer*, v. 24, June 1947, p. 69-72; discussion, p. 72-73.

The phenomenon of bacterial deterioration of cutting-oil emulsions is used as an illustrative link to indicate why and how sulphur-reducing bacteria may well be regarded as a subject for study by the industrial microbiologist. The literature is briefly surveyed to emphasize the connection between the lines of investigation familiar to the iron and steel technologist and the lines normally regarded as primarily biological, and to underline the research trends and possibilities in the field of corrosion of iron and steel. 20 ref.

6-146. Corrosion Testing: Evaluation of Metals for Process Equipment. A. Wachter and R. S. Treseder. *Chemical Engineering Progress (Transactions Section)*, v. 43, June 1947, p. 315-326.

Considerations involved in planning, conducting, and interpreting tests. Details of experimental methods and a criterion for evaluating results.

6-147. Corrosion Prevention by Vapor-Type Inhibitor. *Iron Age*, v. 159, June 19, 1947, p. 80.

New product furnished as an alcoholic solution is used to impregnate containers for finished parts to prevent corrosion during storage and shipment. Slow evaporation is said to produce a vapor which inhibits corrosion.

6-148. Diesel Wear Related to Per Cent Sulphur in Fuel. *SAE Journal*, v. 55, July 1947, p. 70.

Effects of sulphur, nitrogen, and naphthenic acid on the rate of wear in diesel engines. (Digest of "Effects of Nitrogen and Sulphur Content of Fuels on Rate of Wear in Diesel Engines," by C. C. Moore and W. L. Kent.)

6-149. Chimney Liner Corrosion Resulting From Gas-Fired Furnaces. George B. Johnson. *Gas Age*, v. 100, July 10, 1947, p. 29-32, 72.

Results of a survey made by Minneapolis Gas Light Co. Three major types of liners have been used to prevent corrosion. These are: asphalt chromate emulsion on specially coated steel (Wilder metal); plastic coating on steel; and aluminum. Of the three types, aluminum has given the best results with manufactured gas.

6-150. The Corrosion of Elektron AM503 Sheet in Chloride Solutions and the Effect of Fluoride Additions and Concentration Variations. C. J. Bushrod. *Magnesium Review and Abstracts*, v. 6 Oct. 1946, p. 132-138.

In order to obtain information on the corrosive action of welding fluxes, corrosion tests were conducted on specimens of Elektron AM503 magnesium-base alloy sheet immersed in chloride and fluoride solutions. It was found that fluoride additions were dangerous unless present in very large relative concentration, when they completely inhibited attack. Reducing the concentration of chloride ions in the absence of fluoride ions caused the attack to become much less general, and pitting occurred with increasing frequency. It was concluded that the composition of all fluoride noncorrosive welding fluxes cannot safely be modified to produce lower melting-point mixtures by the addition of small quantities of chlorides.

6-151. The Corrosion of Iron and Steel and Its Prevention. J. C. Hudson. *Official Digest*, v. 264, Jan. 1947, p. 26-39; discussion, p. 40-42.

British test program and results obtained. The corrosion of bare iron and steel; protective measures against rusting; protective coatings for iron and steel; protective coatings for heavy structural iron or steelwork; and protective coatings for light-gage iron and steel parts.

6-152. Corrosion of Underground Cable Sheaths Due to Local Cells. L. F. Greve. *Proceedings of the Midwest Power Conference*, v. 9, 1947, p. 190-197.

Methods employed by a large utility company for mitigating the extremely troublesome corrosive conditions due to local cells on the underground cable system.

6-153. The Corrosion of Some Magnesium-Base Alloys (High and Normal Purity) in Contact With Other Metals. F. A. Fox and J. K. Davies. *Journal of the Institute of Metals*, v. 14, May 1947, p 553-566.

Results of a study of the corrosion of magnesium-base alloys immersed in 3% sodium chloride solution saturated with magnesium hydroxide, while in electrical contact with other metals. While the galvanic corrosion of many magnesium-base alloys is anodically

controlled, the magnesium-aluminum alloys behave differently. It is suggested that the surface anodic film is unstable and nonadherent, and that the corrosion is controlled by cathodic reactions.

6-154. Note on the Quantitative Implications of Hanawalt's Theory of Corrosion of Magnesium-Base Alloys. C. J. Bushrod. *Journal of the Institute of Metals,* v. 14, May 1947, p. 567-572.

The above theory is developed on a quantitative basis. The resulting equation is shown to agree with experimental results previously obtained, using two alloys of differing iron content. It is suggested that the equation should be fitted to results obtained from alloys in which the impurities were subject to closer control but, in addition, *à priori* reasons are given for supposing that the basis theory is incorrect.

6-155. Contact Corrosion Problems in the Metal Window Industry. E. F. Pellowe and F. F. Pollak. *Metallurgia,* v. 36, June 1947, p. 67-70.

The contact corrosion of cast aluminum to steel, galvanized steel, brass, pure aluminum, and stainless steel. Accurately weighed disks of the various materials were placed in contact, then immersed in salt solution and water followed by a period of drying. This treatment continued for several weeks and the samples were then cleaned and re-weighed. Results are correlated with A.S.T.M. data. 11 ref.

6-156. Steam Turbine Lubrication Problems and Their Solutions. Part IV. Primary Rusting. Alan Wolf. *Petroleum,* v. 10, June 1947, p. 134-136.

Painting of oil reservoirs; indications of oil deterioration; rusting in new turbines; corrosion inhibitors; corrosion research results. (To be continued.)

6-157. The Corrosion of Metals; Zinc and Its Alloys. Part VII. *Sheet Metal Industries,* v. 24, June 1947, p. 1207-1211.

Bimetallic couple with zinc; atmospheric corrosion; natural, distilled, and sea-water attack; effect of temperature; protective-film composition; chemical corrosion in batteries; corrosion in miscellaneous domestic applications. (To be continued.)

6-158. Corrosion of Filters in Sugar Refineries. Part II. Investigations on Prepared Liquors. H. Inglesent and J. Anderson Storrow. *Industrial Chemist,* v. 23, June 1947, p. 373-379.

How liquors and electrodes were prepared; measurement of potential; results obtained with cane sugar and glucose syrup liquors; the effect of chloride content; the brass-phosphor bronze cell; need for prespecification tests.

6-159. Cathodic Protection of Pipelines. H. Seymour. *Mining Magazine,* v. 76, June 1947, p. 339-340.

Use of magnesium alloy anodes to prolong the life of buried pipes.

6-160. Companies Unite Against Ravages of Salt Water in Research at Kure Beach Ocean Laboratory. Warren W. Burns. *Oil and Gas Journal,* v. 46, June 28, 1947, p. 107-108, 111.

Research facilities and programs for prevention of salt-water corrosion of metals, for prevention of fouling, and for prevention of marine-borer attack on wooden structures at Kure Beach.

6-161. Corrosion in High-Pressure Gas Condensate Wells—Gulf Coast Area. Part II. T. S. Zajac. *Oil and Gas Journal,* v. 46, June 28, 1947, p. 127, 129-130, 132, 135, 136, 138, 141-142.

Various inspection methods and methods for prevention and alleviation. 14 ref.

6-162. Scientific Attack on Corrosion Under Way. *Chemical and Engineering News,* v. 25, June 30, 1947, p. 1859.

Reviews papers presented at the first university conference on Corrosion and Metal Protection at the Museum of Science and Industry, Chicago, June 11 through 13.

6-163. Corrosion Rates of Metals Determined by Extensive Tests. *Machinery,* v. 53, July 1947, p. 164-166.

Cooperative test program at Kure Beach, N. C., for iron, steel, and steel alloys exposed to salt water and salt-water atmospheres.

6-164. Correct Materials Make Feed Pumps Immune to Corrosion-Erosion. H. L. Ross. *Power,* v. 91, July 1947, p. 86-88.

The six causes of corrosion-erosion in boiler-water feed pumps. Resistance of the different metals and alloys commonly used for these pumps. Suggestions for alleviation of trouble in carbon steel pumps now in operation.

6-165. Corrosion Testing Facilities Expanded at Kure Beach. Richard K. Lotz. *Steel,* v. 121, July 14, 1947, p. 88-90, 92, 130, 134.

Results of sea-water corrosion testing of nickel alloys, nickel and chromium steels, and magnesium alloys. Relative corrodibility of atmospheres at 20 locations throughout the world.

6-166. Tests for Hot Water Resistance of Tank Enamels. Dwight G. Moore and William N. Harrison. *Journal of the American Ceramic Society,* v. 30, July 1, 1947, p. 220-226.

Resistance of a representative group of commercial enamels was measured by three types of test: loss of gloss after periods up to several hours in a conventional autoclave with dis-

tilled water; loss of gloss after one day to two weeks in apparatus which kept the specimens in contact with constantly changing, boiling distilled water; and loss in thickness after periods up to 5000 hr. in a modified autoclave with circulating aerated tap water under pressure.

6-167. Influence des Impuretés sur la Corrosion du Plomb. (Influence of Impurities on the Corrosion of Lead.) Henri Guiter. *Bulletin de la Société Chimique de France,* Jan-Feb. 1947, p. 74-76.

All of the investigated impurities, with the exception of mercury, increased the rate of lead corrosion in nitric acid; the rate decreases when the concentration of the impurities is lowered.

6-168. Mechanism of the Action of Inhibitors During the Dissolution of Iron by Acids. V. A. Kuznetsov and Z. A. Iofa. *Journal of Physical Chemistry (U.S.S.R.),* v. 21, no. 2, 1947, p. 201-214. (In Russian.)

Influence of a series of organic compounds on the rate of solution of pure iron in hydrochloric acid. Results indicated by polarization curves. 29 ref.

6-169. Acid Dichromate Treatment for Magnesium Alloys. George Black. *Products Finishing,* v. 11, July 1947, p. 42, 44, 46.

Formulation and application of above surface treatment for inhibiting the corrosion of magnesium in salt-water atmospheres.

6-170. A Survey of High-Temperature, Gas-Atmosphere Corrosion of Iron-Nickel-Chromium Alloys. Part I. James T Gow. *Corrosion,* v. 3, July, 1947, p. 311-324.

A correlation of quantitative data from the literature on the hot-gas corrosion behavior of the heat resistant alloys especially in air and flue gases. 10 ref. (To be continued.)

6-171. The Electrical Engineer's Responsibility for Recognizing Corrosion as a Factor in the Design of Electrical Structures. M. C. Miller. *Corrosion,* v. 3, July 1947, p. 341-346.

Urges that electrical engineers utilize available information in design work in order to reduce corrosion of underground metallic structures. Common practices which result in corrosion.

6-172. Further Discussion of Paper—Chemical Corrosion Resistance of Lead. Robert L. Ziegfeld. *Corrosion,* v. 3, July 1947, p. 347-348.

Reply to H. H. Uhlig's discussion in March issue. Disagrees with some of the latter's statements concerning the danger of lead poisoning resulting from lead water pipes.

6-173. A Magnesium Anode Installation for Preventing the Corrosion of Lead Cable Sheath. H. A. Robinson and R. L. Featherly. *Corrosion,* v. 3, July 1947, p. 349-357.

Service data on a lead-sheathed cable installation. Electrical duct survey methods show that protection has been continuously maintained for nearly two years, and anode-current log gives assurance of continued protection for the life of the anodes.

6-174. The Causes and Prevention of Stress-Corrosion in Brass. J. C. Chaston. *Sheet Metal Industries,* v. 24, July 1947, p. 1395-1401, 1404.

A survey of recent theories and investigations.

6-175. Corrosion of Metals; Metals in Aircraft Engine Cooling Systems. P. F. Thompson. *Australian Council for Aeronautics, Melbourne, Australia, Report ACA-24,* May 1946, 54 p.

The theory of corrosion. A study of inhibitors and their use. An electrochemical technique for the study of corrosion problems, and details of its use in study of the growth and breakdown of metal films. The relationship of two types of corrosion to film formation on aluminum is confirmed by the discovery of hydrogen evolution on aluminum during abrasion in neutral liquids containing water. The use of a powder in studying abrasion of films on metals in electrolytes.

6-176. Report of Committee B-8 on Electrodeposited Metallic Coatings. *American Society for Testing Materials Preprint 15,* 1947, 7 p.

Results of atmospheric exposure tests on copper-nickel-chromium deposits on high-carbon steel and on electroplated lead coatings on steel.

6-177. The Dissolution of Gold in Cyanide Solutions. P. F. Thompson. *The Electrochemical Society Preprint 91-26,* 1947, 27 p.

The above process is first considered from a theoretical point of view, and then investigated experimentally. The results have value not only for the cyanidation of gold ores, but also for the information they provide concerning the corrosion of gold.

6-178. Scaling at High Temperatures in Sulphur Dioxide, Oxygen and Nitrogen-Containing Atmospheres. J. H. Nicholson and E. J. Kwasney. *The Electrochemical Society Preprint 91-28,* 1947, 10 pages.

Data on the corrosion of steel, alloy steels, cast iron, and calorized steel in sulphur-dioxide-oxygen-nitrogen atmospheres at elevated temperatures.

6-179. An Electron Diffraction Study of Oxide Films Formed on High Temperature Oxidation Resistant Alloys. J. W. Hickman and E. A. Gulbransen. *The*

Electrochemical Society Preprint 91-32, 1947, 16 p.

Electron-diffraction-reflection technique is used to study the structures of the oxides which form on Alchrome-6, Worthite, stainless steels 301, 446, and alloy S588 in the temperature range 300 to 900° C. The structures found are plotted on existence diagrams as functions of time and temperature. Attempts are made to correlate them with thermodynamic data reported by other workers.

6-180. The Kinetics of Oxide Film Formation on Metals and Alloys. Earl A. Gulbransen. *The Electrochemical Society Preprint 91-29,* 1947, 30 p.

The kinetics is broken down into 11 fundamental factors. These are: time; temperature; pressure; surface preparation and passivation treatments; gas in the metal lattice; surface area; crystal orientation; gas flow; cycle oxidation; vacuum effect; and stability of the oxide film. Rate experiments on the metals aluminum, magnesium, tungsten, molybdenum, iron, and 18-8 stainless illustrate the effect of the variables.

6-181. Literature Review on Corrosion of Metals and Materials. *Battelle Memorial Institute Report No. 1 to the American Gas Association,* Feb. 1947, 29 p.

Results of a literature search. Material from 55 articles published during the past 25 years is correlated and presented in concise form. 55 ref.

6-182. Increase in the Life of a Smoke Exhaust Fan. A. F. Tagin. *Industrial Power (U.S.S.R.),* v. 4, no. 2, 1947, p. 12-13. (In Russian.)

Proposes application of a powdered alloy containing 18% Cr, 10% C, 15% Mn, 2% Si, and 55% Fe, to the blades to prevent corrosion caused by smoke. The powder is fused by an electric arc.

6-183. Hauteur et Nature des Aspérités sur les Surfaces de Cuivre Polies Electrolytiquement. (Character of Roughness on the Surface of Electrolytically Polished Copper.) Henri Frisby. *Comptes Rendus,* v. 224, March 31, 1947, p. 1003-1005.

Investigation of electrolytically polished copper directly after removal from the bath showed much less roughness than usual. It is believed that such a surface is subject to oxidation. When left wet in the air, it became covered, in a few minutes, with several monomolecular layers of cuprous oxide.

6-184. German Theories and Accomplishments in the Field of Stress-Corrosion Cracking. Charles A. Naugle. *Headquarters Air Materiel Command, Wright Field, Technical Report F-TR-*1131-*ND,* June 1947, 78 p.

The period of scientific effort covered is from 1938 to 1944. Work accomplished during the critical years in Germany which closely paralleled the efforts of metallurgists in the United States.

6-185. The Scaling Behavior of High-Strength Heat Resisting Steels in Air and Combustion Gases. W. Stauffer and H. Kleiber. *Journal of the Iron and Steel Institute,* v. 156, June 1947, p. 181-188.

A new apparatus and technique for carrying out scaling tests in gas mixtures. This apparatus was used for studying the effect of synthetic combustion gases with low, medium, and high sulphur contents on martensitic, ferritic, and austenitic high-strength heat resistant steels. The work was done at Escher-Wyss in Switzerland.

6-186. Sulphur Dioxide Vs. Materials of Chemical Plant Construction. W. E. Pratt. *Chemical Engineering,* v. 54, July 1947, p. 221-222, 224.

Part I of a symposium in which manufacturers of typical materials evaluate their products for services involving wet and dry SO_2 and sulphurous acid. Nickel, nickel alloys, by W. Z. Friend. Silicones, by J. A. McHard.

6-187. Corrosion and Embrittlement of Boiler Metal at 1350 Psi. Operating Pressure. L. E. Hankison and M. D. Baker. *Transactions of the A.S.M.E.,* v. 69, July 1947, p. 479-486; discussion, p. 500-503.

After seven years of operation, three 1350-psi. boilers at the Springdale Station of the West Penn Power Co. developed a type of barnacle corrosion and metal embrittlement which caused considerable apprehension regarding safety and continuous operating ability. Investigation made of the trouble and steps taken to correct it.

6-188. Experiences With Internal-Boiler-Surface Corrosion in 1450-Lb. Open-Pass Boilers at West End Station of the Cincinnati Gas and Electric Co. E. H. Mitsch and B. J. Yeager. *Transactions of the A.S.M.E.,* v. 69, July 1947, p. 487-491; discussion, p. 500-503.

Pit-type corrosion occurred in April 1940, after three years of operation without difficulty. In February 1941, the first failure by corrosion at the rolled joints of tubes occurred. This type of corrosion stopped being active about the beginning of 1942 and had not recurred up to June 1946. Conditions of operation, boiler-water concentrations, and other factors are described and compared in order to determine the causes of corrosion or to determine the factors responsible for arresting it.

6-189. Wall-Tube Corrosion in Steam-Generating Equipment Operating Around 1300 Psi. F. G. Straub. *Transactions*

of the A.S.M.E., v. 69, July 1947, p. 493-499; discussion, p. 499-503.

Several instances of boiler-tube failures of brittle and nonbrittle types. Brittle failure may be caused by the presence of dissolved oxygen in the feedwater in the absence of a suitable oxygen scavenger in the boiler water. The nonbrittle type was caused by caustic attack.

6-190. Corrosion by Chlorine and by Hydrogen Chloride at High Temperatures. M. H. Brown, W. B. Delong, and J. R. Auld. *Industrial and Engineering Chemistry,* v. 39, July 1947, p. 839-844.

Results of short-time exposure of a number of common metals and alloys to dry hydrogen chloride and to dry chlorine at elevated temperatures. The effect on corrosion of dilution of these gases with air, sulphur trioxide, or water vapor was also investigated.

6-191. Surface Layers on Steel in Natural Gas Condensate Wells. Norman Hackerman and D. A. Shock. *Industrial and Engineering Chemistry,* v. 39, July 1947, p. 863-867.

Micrographic studies of coupons exposed in the well-head have led to a means of classification and prediction of the corrosive character of condensate gas wells. A noncorrosive type of well has been found in which the surface layer formed on steel is thin, adherent, and apparently nonporous. An explanation is offered on the basis of the presence of an inhibitor in the hydrocarbon phase.

6-192. Nitrogen-Containing Organic Inhibitors of Corrosion. Shih-Jen Ch'Iao and Charles A. Mann. *Industrial and Engineering Chemistry,* v. 39, July 1947, p. 910-919.

A quantitative relation between cathode potential rise upon addition of inhibitor and its inhibition efficiency. The difference in functions between nitrogen-containing organic inhibitors and cathodic inorganic inhibitors. 28 ref.

6-193. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 39, July 1947, p. 85A-86A.

Selection of materials and proper design for controlling galvanic corrosion.

6-194. Maintenance of Tubular Heat Exchangers. J. G. Housman. *Petroleum Refiner,* v. 26, July 1947, p. 89-92.

The applicability of different alloys for the reduction of corrosion and scale formation; tube-cleaning methods.

6-195. Corrosion Studies for the Petroleum Refining Industry. Part II. Factors Affecting Corrosion. F. A. Rohrman. *Petroleum Refiner,* v. 26, July 1947, p. 93-98.

(To be concluded.)

6-196. Corrosion and Preventive Methods in Katy Field. R. C. Buchan. *Petroleum Engineer,* v. 18, July 1, 1947, p. 159-160, 163, 165, 168, 171-172.

The effects of acidic-water corrosion. The use of plastic-coated pipe, and of soda ash as a neutralizing agent. The need for continued research and for field testing of alloys. Full-scale field tests are recommended as soon as corrosion is found in new fields.

6-197. Corrosion Surveys. M. E. Parker. *Petroleum Engineer,* v. 18, July 1, 1947, p 270, 272, 274, 276-278, 280, 282, 284.

The methods used in surveying pipe lines for corrosion. A combination of protective coating and electrical protection is believed to be the best prevention.

6-198. Resistance of Several Stainless Steels to Various Corrosive Media. *Materials & Methods,* v. 26, July 1947, p. 121, 123.

A tabulation.

6-199. The Mechanism of Cavitation Erosion. Thomas C. Poulter. *Frontier,* v. 10, June 1947, p. 7-11, 28.

The mechanism is clarified by the results of the application of pressure to gases in contact with liquids and solids. Penetration of atomic and molecular hydrogen into metal and of water into glass. The presence of high-frequency vibrations from a magnetostriction oscillator has a marked effect on the cavitation erosion of gray cast iron.

6-200. Sur l'Oxydation de l'Aluminium en Atmosphere Seche. (Concerning the Oxidation of Aluminum in a Dry Atmosphere.) Nicolas Cabrera, Jean Terrien, and Jean Hamon. *Comptes Rendus,* v. 224, June 2, 1947, p. 1558-1560.

Investigations indicate that the passage of ions controls the rate of oxidation. The presence of ultraviolet light accelerates the oxidation.

6-201. The Mechanism of Corrosion of Water Pipes. Thomas M. Riddick. *Water & Sewage Works,* v. 94, July 1947, p. R149-R154.

Three empirical formulas express numerically the corrosive tendencies of water from analyses.

6-202. Plastic Insulation. J. A. Clay, Jr. *Oil and Gas Journal,* v. 46, July 26, 1947, p 245-246, 248, 250, 253.

Used to provide protection against stray-current corrosion in oil and gas wells and piping systems.

6-203. Review of N.G.A.A. Research on Gas-Condensate-Well Corrosion. T. S. Bacon. *Oil and Gas Journal,* v. 46, July 26, 1947, p. 257-258, 260-261, 263.

Activities and accomplishments of a cooperative research project concerned with the study of corrosion in gas-condensate wells.

6-204. Les Bases Thermodynamiques de la Theorie de la Corrosion. (Thermodynamic Bases of the Theory of Corrosion.) Marcel Pourbaix. *Metaux et Corrosion,* v. 21, Oct-Nov. 1946, p. 121-129.

Mathematical formulas and electrical data relating corrosion and thermodynamic properties.

6-205. Stress-Corrosion Cracking of High-Chromium Steel (E.Zh.Z). L. A. Glikman and V. A. Stepanov. *Boiler and Turbine Construction (U.S.S.R.),* Feb. 1947, p. 19-21. (In Russian.)

The failure of bushings on the shafts of turbines was caused by stress-corrosion cracking.

6-206. La Protection Galvanique du Fer par les Anodes en Magnesium. (Galvanic Protection of Iron by Magnesium Anodes.) Bernard J. C. Raclot. *Metaux et Corrosion,* v. 21, Feb. 1947, p. 28-30.

The properties of both zinc and magnesium; pure magnesium is found to have the highest potential. The anode is buried in a mixture of tar and paraffin within a few feet of the pipe.

6-207. Gage-Glass Condensate Cracks Metal by Pocketing at Drum Counterbore. J. A. Keeth. *Power,* v. 91, Aug. 1947, p. 78-79.

Investigation of trouble which developed after many years of trouble-free operation revealed that corrosion fatigue was responsible. The difficulty was eliminated by changing drum connections so that returning condensate diffused into the boiler water instead of remaining undiluted in the counterbore where it had caused cracking. (Abstract of paper for National Association of Corrosion Engineers, May 1946.)

6-208. Marine "Lab" Aids Corrosion Research. E. W. Feller. *Power,* v. 91, Aug. 1947, p. 90-91.

Kure Beach project.

6-209. Put Ocean in Test Tube for Corrosion Tests. *Industry and Power,* v. 53, Aug. 1947, p. 94.

Kure Beach setup.

6-210. Effects of Pressure Cycling on Physical Properties of Materials. T. C. Poulter. *Product Engineering,* v. 18, Aug. 1947, p. 81-85.

The phenomenon of cavitation erosion and the results of experimental work at Armour Research Foundation in which the effects of pressure cycling on two types of specimens were determined. Specimens of 24S-T aluminum alloy sheet were cycled 20 times to 140,000 psi. The cycled specimens showed less tendency to warp on machining than the controls.

6-211. A Survey of High-Temperature, Gas, Atmosphere Corrosion of Iron-Nickel-Chromium Alloys. Part II. James T. Gow. *Corrosion,* v. 3, Aug. 1947, p. 383-403; discussion, p. 403-405.

Survey of hot-gas atmospheric corrosion of the above alloys being conducted at Battelle Memorial Institute under the sponsorship of the Alloy Casting Institute. Considerable information from unpublished research. 10 ref.

6-212. Arsenic as a Corrosion Inhibitor in Sulphuric Acid. A. Wachter, R. S. Treseder, and M. K. Weber. *Corrosion,* v. 3, Aug. 1947, p. 406-414.

The inhibitive properties of arsenic compounds in strong sulphuric acid solutions on the corrosion of carbon steel.

6-213. Periodic Cleaning of Drill Pipe. L. R. Jackson, H. M. Banta, and R. C. McMaster. *Drilling Contractor,* v. 3, June 15, 1947, p. 50-53.

A preliminary laboratory investigation of the influence of periodic cleaning upon the corrosion-fatigue operating life of steel in salt water. The tests indicate that such cleaning does not damage drill pipe, and probably adds to its operating lifetime.

6-214. Copper-Strip Corrosion Tests. J. A. Bolt. *Oil and Gas Journal,* v. 46, Aug. 9, 1947, p. 99-100.

In determining corrosiveness of various light-oil products by current test procedures, it was observed that copper-strip corrosion manifests itself in a series of distinct colors. Degree of corrosion is correlated with the colors. Tentative sets of corrosion standards have been prepared.

6-215. Zinc-Iron Couple in Water at Elevated Temperature. George D. Lain. *Corrosion and Material Protection,* v. 4, July-Aug. 1947, p. 12-15.

The possibility of a reversal in potential of the zinc-iron couple in natural waters at elevated temperatures with emphasis on the behavior of hot-dipped galvanized steel pipe in a natural water with a total hardness of less than 60 parts per million expressed as calcium carbonate, and carrying dissolved oxygen and carbon dioxide close to the point of saturation.

6-216. Insulation of Dissimilar Metal Faying Surfaces. Bernard W. Floersch. *Corrosion and Material Protection,* v. 4, July-Aug. 1947, p. 16, 18.

Results of a series of tests to determine the optimum organic insulation necessary for protection against galvanic corrosion in various dissimilar metal contacts.

6-217. Activation of Passive Iron. W. H. Cone and Don H. Anderson. *Corrosion and Material Protection,* v. 4, July-Aug. 1947, p. 21-23.

Test for passivity, its possible causes and solution for change to active state.

6-218. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 39, Aug. 1947, p. 93A-94A.

Cathodic methods for protecting equipment from corrosion and new developments in materials.

6-219. Is Cast Iron Superior in Corrosion Resistance to Steel? R. W. White. *Materials & Methods,* v. 26, Aug. 1947, p. 82-85.

Results of comprehensive tests showed that, with the finishes involved, steel offered greatest corrosion resistance.

6-220. Testing Acid Resisting Steels for Their Resistance to Intercrystalline Corrosion. Siegfried Plankensteiner. *Metallurgia,* v. 36, July 1947, p. 145-148.

Report, based on experiments and tests, on the determination of the resistance to intercrystalline corrosion of austenitic chromium-nickel and chromium-nickel-molybdenum steels. A new testing liquid gives quicker and more accurate results.

6-221. Automobile Exhaust Valve Materials and Lead Attack. R. J. Brown. *Metallurgia,* v. 36, July 1947, p. 149-154.

Two forms of corrosion which are due to lead attack on automobile exhaust valve material. The ideal valve material has yet to be discovered. The problem is claimed to be one of faulty combustion rather than of faulty metallurgical technique.

6-222. Sur l'Oxydation de l'Aluminium a Haute Temperature. (The High-Temperature Oxidation of Aluminum.) Nicolas Cabrera and Jean Hamon. *Comptes Rendus,* v. 224, June 16, 1947, p. 1713-1715.

In studying the oxidation of aluminum at various temperatures, it was found that different methods had to be used below and above 200° due to the rapidly increased rate of oxidation at the higher temperatures. Formulas for estimating the electronic charge, according to Mott's theory of oxidation.

6-223. Sur l'Oxydation de l'Aluminium en Atmosphere Humide. (The Oxidation of Aluminum in a Humid Atmosphere.) Nicolas Cabrera and Jean Hamon. *Comptes Rendus,* v. 225, July 7, 1947, p. 59-61.

Plates coated wtih almost opaque layers of aluminum were oxidized in the presence of varying amounts of water vapor. A formula for estimating the thickness of oxidized Al takes into account that the amount of oxidation in moist atmospheres depends on pressure and does not agree with Mott's theory of oxidation in a dry atmosphere.

6-224. Corrosion Studies for the Petroleum Refining Industry. Part III. Corrosion Tests. F. A. Rohrman. *Petroleum Refiner,* v. 26, Aug. 1947, p. 109-113.

Corrosion testing and corrosion prevention. (Concluded.)

6-225. Copper Strip Corrosion Tests. John A. Bolt. *Petroleum Refiner,* v. 26, Aug. 1947, p. 118-120.

Tentative sets of corrosion standards for comparison and specification purposes.

6-226. Costs of Corrosion to the Water Industry. Harry E. Jordan. *Journal of the American Water Works Association,* v. 39, Aug. 1947, p. 773-778.

Cost according to size of industry, restoring capacity, cost of relining, and methods of reducing corrosivity.

6-227. The Corrosion of Metals. Part VIII. Aluminum and Its Alloys. *Sheet Metal Industries,* v. 24, Aug. 1947, p. 1633-1636.

The good corrosion resistance of aluminum is surprising in view of its position in the electromotive series where it has a normal electrode potential of 1.33 volts, being more anodic than most of the common metals, such as copper, iron or lead. Aluminum has a high affinity for oxygen, and the natural oxide film formed on it is highly protective, both against further oxidation by the atmosphere and against attack by many other media. The protective properties of the oxide film on aluminum are exploited in the anodic oxidation processes.

6-228. Electrolytic Oxidation of Aluminum-Magnesium-Zinc Alloy Hy-43. O. Lohrmann. *Headquarters Air Materiel Command, Wright Field, Translation No. F-TS-1858-RE,* Aug. 1947, 19 p.

The aluminum-magnesium-zinc alloy Hy-43 is suitable for aircraft material with the addition of chromium. To increase its resistance against corrosion, Hy-43 is to be anodized.

6-229. Heavy-Metal Inserts and Corrosion. *Light Metals,* v. 10, Aug. 1947, p. 418-421.

Incidence and prevention of bimetallic corrosion provoked by various steel and copper-base elements in a magnesium casting alloy. The protective effect of the "Alrok" process for aluminum exposed to a similar hazard.

6-230. Use of Chromate Additions in Drilling Fluids. L. R. Jackson, H. M. Banta, R. C. McMaster and T. P. Nordin. *Drilling Contractor,* v. 3, Aug. 15, 1947, p. 77-82.

Laboratory tests and field observations on the use of sodium chromate additions in drilling fluids, to inhibit corrosion-fatigue damage of drill pipe.

6-231. Stress-Corrosion Cracking of Welded Mild Steel Gas Mains. *Engineering,* v. 164, Aug. 22, 1947, p. 186.

Present status of work being conducted by the British Welding Research Association.

6-232. Anodic Behavior of Mild Steel in Strongly Alkaline Solutions. Chas. D. Weir. *Nature,* v. 160, Aug. 23, 1947, p. 259.

Results of experiments.

6-233. Activation of Copper by Oxidation and Reduction. F. C. Aldred and F. Happey. *Nature,* v. 160, Aug. 23, 1947, p. 267-268.

Preliminary X-ray observations on the crystalline changes produced in the metallic and oxide films of copper during the activation process. A probable mechanism of activation is deduced from these results and those of Garner and Stone.

6-234. The Mechanism of Corrosion Fatigue of Steel in Acid Solution. M. Tchorabdji Simmad and U. R. Evans. *Journal of the Iron and Steel Institute.* v 156, Aug. 1947, p 531-539.

Corrosion fatigue in HCl shows certain analogies to, but also marked differences from, that in KCl. At the end of an incubation period, rounded pits develop into cracks, the residual strength sharply declines, the rate of chemical corrosion greatly increases, and the potential drops; these four changes occur sooner at high than at low stress ranges. A cathodic current can prevent detectable chemical attack but does not greatly increase life. The results are best explained by the changes produced by stress within the metal. 23 ref.

6-235. Six Methods for Controlling Corrosion Rates of Metals. H. H. Uhlig. *Industry and Power,* v. 53, Sept. 1947, p. 85-86.

Recently developed methods, possible applications, advantages, and limitations. (Based on paper published by American Chemical Society.)

6-236. The Chemical De-Scaling of Boilers. R. H. Burns. *Engineers' Digest (American Edition),* v. 4, June 1947, p. 259-262.

Over 500 tests on various metals and alloys, using a variety of inhibitors and concentrations, are summarized and tabulated. Recommended cleaning procedures for large and small boilers; suggested control tests. 10 ref. (Condensed from *Journal of the Institution of Heating and Ventilating Engineers,* v. 14, Jan-Feb. 1947, p. 376-403.)

6-237. Heat Resistance. W. Stauffer and H. Kleiber. *Iron and Steel,* v. 20, Aug. 1947, p. 425-428; discussion, p. 407-409.

Resistance of well known heat resistant steels to chemical attack by air and by sulphur-bearing combustion gases. The investigations were carried out on the Escher-Wyss gas turbine at Zurich, the design of which is briefly described.

6-238. Effect of Carbide Structure on the Corrosion Resistance of Steel. R. W. Manuel. *Corrosion,* v. 3, Sept. 1947, p. 415-431; discussion, p. 431.

Much experience with oil-well and oil-pipeline corrosion indicates that the carbide structure of the steel has a great effect on corrosion resistance under conditions in which solid corrosion products form on the surface. Well-formed pearlite with lamellae which are long, straight, and continuous are definitely beneficial. Spheroidization of the pearlite removes this effect. Distortion by heating and alloying elements which affect the structure may also be harmful. (Presented at Annual Meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6-239. Cathodic Protection of 138-KV. Lead Sheathed Power Cables of the Los Angeles Department of Water and Power. Irwin C. Dietze. *Corrosion,* v. 3, Sept. 1947, p. 432-442.

Development and installation of the system. (Presented at Annual Meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6-240. Resistance of Aluminum Alloys to Fresh Waters. D. W. Sawyer and R. H. Brown. *Corrosion,* v. 3, Sept. 1947, p. 443-456.

Results of examination of piping, cooking utensils, and chemical process equipment, after service in contact with different types of natural water. Variations among the different aluminum alloys and Alclads are pointed out. (Presented at Annual Meeting of N.A.C.E., Chicago, April 7-10, 1947.) 13 ref.

6-241. Chemical Research and Corrosion Control: Some Recent Contributions of a Corrosion Research Group. W. H. J. Vernon. *Journal of the Society of Chemical Industry,* v. 66, May 1947, p. 137-142.

Work of the Corrosion Research Section of Chemical Research Laboratory, Department of Scientific and Industrial Research (England), since 1939. High-speed rotor apparatus for accelerated immersed corrosion tests; high-duty coatings; antifreeze solutions; corrosion inhibitors for use in heat exchange systems, de-icing systems, wrapping materials, enclosed air spaces; accelerated atmospheric corrosion tests; methods of pretreatment; bituminous coatings; microbiological (soil) corrosion; miscellaneous investigations and information services. 17 ref.

6-242. Preventing Corrosion in Gas-Condensate Wells. P. L. Menaul and P. P. Spafford. *Petroleum Technology,* v. 10, July 1947, T. P. 2229, 8 p.

The most dangerous form of corrosion encountered in condensate-well oil production, the discovery of the agent causing this corrosion, and the remedial chemical treatment proved effective by field use. The injection of NH_4OH has proved effective. The injection of "bone oil" is applied to wells producing brines containing Ca and Mg salts.

6-243. Statistical Analysis of Test Containers for Condensate Well Corrosion Studies. V. V. Kendall. *Corrosion,* v. 3, Aug. 1947, p. 359-366.

Two types of specimens were used in the study of corrosion in the flow lines of condensate wells—a washer-type mounted on a rod and a cylinder-type.

6-244. Corrosion in the Tropics. K. G. Compton. *Electrochemical Society Preprint 91-35,* 1947, 10 p.

Weather conditions in several tropical locations; change of relative humidity over the daily cycle. Zinc is particularly susceptible to corrosion by high humidity and condensation. Relative corrosion resistance of various metals.

6-245. An Attempt to Select a Suitable Specimen for the Study of Corrosion Cracking in 18-8 Steel. M. H. Springer, E. V. Succop, D. S. McKinney and M. A. Scheil. *Welding Journal,* v. 26, Sept. 1947, p. 530s-538s.

An extensive investigation of various types of test specimens, following a series of heat treatments. Corrosion cracking of austenitic stainless steels requires a rather critical combination of heat treatment, applied stress, and corroding environment. A program for recommended future research.

6-246. The Prevention of Metallic Corrosion. G. Fitzgerald-Lee. *Aeroplane,* v. 78, Aug. 29, 1947, p. 251-252, 253.

Review of the various methods.

6-247. Cathodic Protection of Underground Systems. Joe Frink. *American Gas Journal,* v. 167, Sept. 1947, p. 27-29.

Principles and techniques.

6-248. Sulphur Dioxide Versus Construction Materials. *Chemical Engineering,* v. 54, Sept. 1947, p. 209-210.

Final part of symposium. Haveg described by E. P. Mampe; lead by H. M. Church, Jr.; and tantalum by Frederick L. Hunter.

6-249. Selective Corrosion of Phosphor Bronze. W. D. Clark. *Engineering,* v. 164, Aug. 29, 1947, p. 214-216.

A metallographic study of all the available pump impellers which had been in service in the feed-water system of a power station in order to determine the nature and cause of corrosion leading to failure. Concluded that attack is by selective solution analogous to dezincification and that solution and redeposition are almost certainly involved. (Condensed from "A Note on the Selective Corrosion of Phosphor Bronze in Hot-Water Service," presented to Institute of Metals, March 6, 1947.)

6-250. Corrosion in Condensate Return Lines Studied. (Concluded.) John F. Collins, Jr. *Heating, Piping & Air Conditioning,* v. 19, Sept. 1947, p. 108-110.

Secretary-Treasurer completes report of 38th annual meeting of National District Heating Association.

6-251. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 39, Sept. 1947, p. 103A-104A.

Recent work at Ohio State University indicates that 18-8S stainless steel becomes passive because of a physically adsorbed gas. This process is reversible in that the alloy can be passivated, broken down, repassivated, broken down, and so on, by alternate exposure to air and vacuum.

6-252. Corrosion Data: Melamine-Formaldehyde Resin and Dilute Hydrochloric Acid. *Clad News,* v. 8, no. 2, p. 7.

Results of corrosion tests in mixture of melamine-formaldehyde resin and dilute hydrochloric acid, on monel, nickel, Inconel, Ni-Resist (Type I), and mild steel. Solution is added to pulp in a process for improving the wet strength of paper.

6-253. Potentials of Some of the Industrial Metals in Organic Acids. V. D. Iakhontov. *Journal of General Chemistry (U.S.S.R.),* v. 17 (79), April 1947, p 635-641. (In Russian.)

Potentials of the common metals were measured in monobasic and dibasic acids and in oxy-acids. The arrangement of metals in the order of the values of their potentials in the organic acids is identical to the classical series with a few exceptions. The observed data are correlated on a theoretical basis. The method may aid in determining the tendencies of metals to react with acids

6-254. The Accuracy of Corrosion Tests Using Improved Apparatus. A. S. Afanas'ev, V. K. Rostovtseva, and M. G. Burakova. *Factory Laboratory (U.S.S.R.),* v. 13, July 1947, p. 847-850. (In Russian.)

Results of a statistical analysis of gravimetric data obtained using the improved apparatus previously described by the first two authors for atmospheric corrosion testing. Considerable improvement in accuracy and reducibility of results is achieved.

6-255. Gamma Ray Detection of Internal Corrosion. Leroy R. Keller. *Petroleum Engineer,* v. 18, Sept. 1947, p. 211-214.

Principles and operation of the Penetron, developed by Texaco Development Corp.

6-256. Zur Kenntnis Elektrolytisch Erzeugter Oxydschichten auf Aluminium. (Concerning Electrodeposited Oxide Layers on Aluminum.) Fritz Liechti and W. D. Treadwell *Helvetica Chimica Acta,* v. 30, no. 5, 1947, p. 1204-1218.

The growth and analytical content of oxide films on aluminum during anodic oxidation in sulphuric and oxalic acid solutions, respectively, with and without bath agitation. Equation is deduced from the curves for the film from the sulphuric acid bath which shows that the sulphate-ion content of the film decreases exponentially with its thickness. In oxalic acid, no appreciable solution of the film takes place.

6-257. La Corrosion Intercristalline de L'Aluminium de Haute Pureté et ses Conséquences au Sujet de la Nature des Joints de Grains. (Intercrystalline Corrosion of High-Purity Aluminum and Its Effects on the Nature of Grain Boundaries.) Paul Lacombe and Nicolas Yannaquis. *Metaux et Corrosion,* v. 22. March 1947, p. 35-37.

Electropolished specimens of pure aluminum sheet are subjected to prolonged attack by 10% HCl. Specimens are attacked along grain boundaries, although resistance to attack is shown in some cases.

6-258. Use of Magnesium, Zinc, Aluminum and Their Alloys in the Cathodic Protection of Steel in Salt Water. R. R. Rogers and C. E. Viens. *Canadian Metals & Metallurgical Industries,* v. 10, Sept. 1947, p. 16-18, 36, 38.

Results of experimental work done in order to find the best way to protect steel piling from salt-water corrosion. Work consisted of three series of tests—with cylindrical and with strip cathodes, and with intermittent immersion (to simulate tide action). The aluminum alloys used were the least satisfactory. The other alloys gave encouraging results.

6-259. Rust Preventive Compounds. Howard B. Carpenter. *Iron and Steel Engineer,* v. 24, Sept. 1947, p. 73-78.

Use in the steel mill. (Presented at A.I.S.E. Annual Convention, Cleveland, Oct. 3, 1946.)

6-260. Thin Oxide Films on Aluminum. Earl A. Gulbransen and W. S. Wysong. *Journal of Physical and Colloid Chemistry,* v. 51, Sept. 1947, p. 1087-1103.

Results of a vacuum-microbalance study of the oxidation behavior of aluminum from 200 to 550° C. Results are correlated with observations on the physical and chemical structure of the oxide film. A few electron-microscope observations. 24 ref.

6-261. Thin Oxide Films on Tungsten. E. A. Gulbransen and W. S. Wysong. *Metals Technology,* v. 14, Sept. 1947, T.P. 2224, 17 p.

Results of a microbalance study of the following problems: the oxidation behavior from 25 to 550° C.; the reduction with pure hydrogen; and the volatility of the films. 27 ref.

6-262. Thin Oxide Films on Molybdenum. E. A. Gulbransen and W. S. Wysong. *Metals Technology,* v. 14, Sept. 1947. T.P. 2226, 17 p.

Presents results of a vacuum-microbalance study of the following problems: the oxidation kinetics from 250 to 450° C.; the reduction with pure hydrogen of the oxide films; the volatility of the films; and their vacuum oxidation at high temperatures. 21 ref.

6-263. Passivity in Chromium-Iron Alloys. Adsorbed Iron Films on Chromium. Herbert H. Uhlig. *Metals Technology,* v. 14, Sept. 1947, T.P. 2243, 10 p.

A mechanism based not on physical protection by an oxide or similar compound but on a change in the tendency of surface metal atoms to react chemically. It was shown by electroplating or evaporating iron on a chromium surface and immersing in HNO_3 that iron in contact with chromium is passive at the interface. A residual film of iron always remained on the surface. The amount resistant to HNO_3 was determined by treating with HCl and analyzing for dissolved iron. The results support the electron configuration theory of passivity and account for the properties of iron alloys containing over 12 to 15% Cr (stainless steels). The amount of residual iron increases with time elapsed after deposition and reaction with nitric acid. Study of this effect shows that surface migration is responsible. This suggests a mechanism for the relatively good protection of some very thin metal coatings, especially commercial electrodeposits of chromium on nickel. 14 ref.

6-264. The Effect of Tensile and Compressive Stresses on the Corrosion of an Aluminum Alloy. W. D. Robertson. *Metals Technology,* v. 14, Sept. 1947, T.P. 2281, 5 p.

Results of an investigation of the effect of an applied tensile stress and a corresponding compressive stress on the general and intergranular corrosion of an aluminum alloy (24S). The type of corrosion was found to be independent of the existence or nature of the applied stress. The function of tensile stress is shown to be that of an accelerator only.

6-265. Outdoor Laboratory Provides Information on Effects of Marine Corrosion.

Civil Engineering, v. 17, Oct. 1947, p. 32-34, 78.

Cooperative laboratory at Kure Beach, N. C.

6-266. Ferric-Ion Corrosion During Acid Cleaning. F. N. Alquist, J. L. Wasco, and H. A. Robinson. *Corrosion,* v. 3, Oct. 1947, p. 482-487.

Type of corrosion occurs during the acid cleaning of equipment containing ferric oxide deposits—corrosion of the parent metal by ferric ions from the iron oxides as they are reduced to ferrous ions. Several ways of reducing or eliminating this type of corrosion. Glyoxal was found most satisfactory in reducing ferric ion before it attacked the metal. (Presented at the Annual Meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6-267. Electrochemical Factors in Underground Corrosion of Lead Cable Sheath. V. J. Albano. *Corrosion,* v. 4, Oct. 1947, p. 488-498; discussion, p. 498-500.

Basic principles of corrosion not involving stray currents, and how they apply to the problems of lead cable-sheath corrosion. (Presented at Annual Meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6-268. Inhibiting Subsurface Sulphide Corrosion. P. L. Menaul. *World Oil,* v. 127, Oct. 1947, p. 150-152, 155.

A means for inhibiting such corrosion through the addition of formaldehyde to the production stream, and financial gain or loss through such practice.

6-269. Effect of Carbide Structure on Corrosion Resistance of Steel. R. W. Manuel. *Steel,* v. 121, Oct. 13, 1947, p. 82-84, 126, 130, 133, 136, 138.

Reprinted from *Corrosion,* v. 3, Sept. 1947, p. 415-431 (see item 6-238).

6-270. The Effect of Anions on the Performance of Sacrificial Anodes. K. M. Wight. *American Gas Association Proceedings,* 1946, p. 304-320.

Data collected during one phase of an investigation initiated to study the factors involved in the cathodic protection of iron in soils by the use of sacrificial anodes. Aluminum, magnesium, and zinc were selected for experimental study.

6-271. Contribution to the Electrochemical Theory of the Solution of Metals by Acids. Parts II and III. Ia. V. Durdin. *Journal of General Chemistry (U.S.S.R.),* v. 17(79), May 1947, p. 844-872. (In Russian.)

The use of the "theory of local elements" to express the rate of solution of metals by acids is evaluated. Use of equations for the rates of electrode processes rather than the above theory is indicated to be preferable. An attempt is made to divide the electrochemical series of metals into three groups: those in which the kinetics of solution by acids are determined by electrode processes; those determined by diffusion processes; and those of a mixed type. Influence of conditions of solution. 26 ref.

6-272. Influence de l'Orientation Cristalline sur l'Oxydation a Chaud du Fer et du Cuivre. (Effect of Crystal Orientation on Hot Oxidation of Iron and Copper.) Jacquès Benard and Jean Talbot. *Comptes Rendus,* v. 225, Sept 1, 1947, p. 411-413.

Iron and copper samples which had been subjected to mechanical working were heated and the rate of oxidation studied. The deformation of polycrystalline copper and iron appears to depend on the unequal rate of oxidation along the crystal planes.

6-273. Hydrogen Attack on Metals at High Temperatures and Pressures. J. Schuyten. *Corrosion and Material Protection,* v. 4, Sept-Oct. 1947, p. 13-18.

A critical review of the literature. Effects on mechanical properties, detection methods, mechanism of attack, and means of preventing or limiting it. 27 ref.

6-274. Corrosion Studies in Natural Gas Condensate Wells; Protective Layers. D. A. Shock and Norman Hackerman. *Industrial and Engineering Chemistry,* v. 39, Oct. 1947, p. 1283-1286.

The absence of localized attack and the low rate of general attack in a certain type of natural-gas condensate well is believed to be caused by the presence of a naturally occurring inhibitor in the hydrocarbon phase which reacts with the steel surface to form a thin but highly protective layer. An investigation of the hydrocarbon phase disclosed the presence of a constituent not found in a corrosive well. Choice of an inhibitor for a corrosive well. Naphthenic acid was found to be satisfactory. The protection provided by sodium dichromate under these conditions. 16 ref. (Presented at 110th meeting of American Chemical Society, Chicago.)

6-275. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 39, Oct. 1947, p. 101A-102A.

Properties and applications of Chlorimets 2 and 3 (high-nickel Mo alloy and high-nickel Mo-Cr alloy, respectively) produced in cast form.

6-276. Cylinder Wear in Diesels—What Causes It; How It Can Be Measured. *SAE Journal,* v. 55, Oct. 1947, p. 31-32, 43.

Based on five papers presented at S.A.E. Summer Meeting, French Lick, Ind., June 6, 1947. Most important factors are shown to be corrosion, abrasion and scuffing.

6-277. Sodium Chloride Versus Construction Materials. *Chemical Engineering,* v. 54, Oct. 1947, p. 211-212, 214, 216, 218.

Part I of a symposium in which typical materials of construction are evaluated for services involving sodium chloride. Iron and steel, by Albert W. Spitz. Worthite, by W. E. Pratt. Chemical porcelain, by John S. Chowning. Silicones, by J. A. McHard.

6-278. Cooperation Hits Corrosion. T. C. Du Mond. *Scientific American,* v. 177, Nov. 1947, p. 210-212.

Cooperative research at Kure Beach, N. C.

6-279. Corrosion in Boiler Feedwater Treating Systems. Part I. Leo F. Collins. *Power Plant Engineering,* v. 51, Oct. 1947, p. 74-76.

The pattern followed by corrosion in systems of this type. (To be continued.)

6-280. The Corrosion of Metals. Part VIII. Aluminum and Its Alloys. (Continued.) *Sheet Metal Industries,* v. 24, Oct. 1947, p. 2026-2028.

Solution potential studies; stress corrosion; influence of forming on stress-corrosion; and effect of composition on stress-corrosion cracking. (To be continued.)

6-281. Corrosion and Growth of Lead-Calcium Alloy Storage Battery Grids as a Function of Calcium Content. U. B. Thomas, F. T. Forster, and H. E. Haring. *Electrochemical Society Preprint 92-12,* 1947, 12 p.

Growth rates of grids containing from 0.077 to 0.137% calcium were measured during a 9-year period of floating service. These were compared with growth rates for grids of 12% lead antimony. 10 ref.

6-282. Buried Pipes. *Iron and Steel,* v. 20, Oct. 1947, p. 484.

Corrosion by sulphate-reducing bacteria.

6-283. The Institute of Metals Autumn Meeting. *Metal Industry,* v. 71, Oct. 3, 1947, p. 279-287; Oct. 10, 1947, p. 302-306.

Abstracts and discussion of the following papers: Surface effects during the annealing of 70:30 brass, by Ivor Jenkins. The centrifugal casting of copper alloy wheels in sand molds, by O. R. J. Lee and L. Northcott. The frictional properties of some lubricated bearing metals, by P. G. Forrester.

6-284. Institute of Metals Autumn Meeting. (Continued.) *Metal Industry,* v. 71, Oct. 17, 1947, p. 326-329.

Summarizes papers and presents discussion on the corrosion of magnesium alloys.

6-285. Treating Steam Chemically to Reduce Return Line Corrosion. A. A. Berk. *Industry and Power,* v. 53, Nov. 1947, p. 79-81, 110, 112.

Tests by U. S. Bureau of Mines indicate that corrosion may be reduced by adding certain amines which vaporize as well as condense with the steam and are returned to the boiler for recirculation. (Based on paper presented at Atlantic City Meeting of National District Heating Association.)

6-286. Refinery Corrosion. C. A. Murray. *Pure Oil News,* v. 30, Nov. 1947, p. 15-17.

A general discussion.

6-287. Corrosion in Condensate Gas Wells. Norman Hackerman and D. A. Shock. *World Oil,* v. 127, Nov. 194‘., p. 198, 200, 202, 204, 206.

Study oi the phenomena involved, both in the laboratory and in wellhead equipment, indicates some of the contributory causes, from which adequate protective means can be developed. Reviews tests made in three wells and outlines findings as a basis for further work. 16 ref.

6-288. The Chemical Erosion of Steel by Hot Gases Under Pressure. Richard C. Evans and others. *Journal of Physical & Colloid Chemistry,* v. 51, Nov. 1947, p. 1404-1429.

An attempt to simplify the problem by studying the two gases largely constituting the products of combustion, CO and CO_2, and then adding to them, one by one, gases often found as traces, such as H_2S, SO_2, NH_3, N_2O, and H_2. Conditions present when erosion is principally a melting phenomenon and the limits to such a state. The peculiar chemical effects present when the temperature is lower and melting is negligible. Description of apparatus.

6-289. Automatic Device for Study of Intercrystalline Cracks in Boiler Steel. N. G. Patsukov and P. A. Akol'zin. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 577-580. (In Russian.)

A device for simulating conditions within a boiler installation in which there is a slight seepage of water through the riveted joints. Apparatus permits application of constant strain to the sample while regulated "leakage" of water at constant temperature takes place.

6-290. Method for Measuring the Corrosion of Welded Joints. I. I. Frumin. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 693-701. (In Russian.)

Three methods for determining the amount of corrosion are use of the profilometer (for deep penetrating corrosion); differential weight method; and application of stress to joints immersed in concentrated alkali. 10 ref.

6-291. Location and Selection of Anode Systems for Cathodic Protection Units. D. B. Good. *Corrosion.* v. 3, Nov. 1947, p. 539-548.

Deals only with anodes placed in the earth's surface. (Presented at annual meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6-292. Electrical Instruments and Measurements in Cathodic Protection. J. M Pearson. *Corrosion,* v. 3, Nov. 1947, p. 549-566.

The uses and limitations of techniques or instruments now in use. (Presented at annual meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6-293. Surface Studies of Metals From the Corrosion Standpoint. M. G. Fontana. *Corrosion,* v. 3, Nov. 1947, p. 567-579.

A study of surface films formed on metals at normal and elevated temperatures (a progress report). Passivation of 18-8 stainless steel; procedures and equipment used.

6-294. Cathodic Protection of Hot Water Tanks. J. M. Bialosky. *Corrosion,* v. 3, Nov. 1947, p. 585-591; discussion, p. 591.

Theory of cathodic protection; a system using magnesium anodes. 13 ref. (Presented at annual meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6-295. Test of Nickel-Plated Pipe in Corrosive Distillate Well. B. B. Morton. *Corrosion,* v. 3. Nov. 1947, p. 592.

Value of above as determined by six months' exposure under field conditions.

6-296. Cathodic Corrosion Protection Studied at Dow Chemical's Metals Protection Laboratory. *Steel,* v. 121, Nov. 10, 1947, p. 106-107, 124.

Facilities, equipment, and procedures. Some of the research programs.

6-297. Application of Corrosion Resisting Materials to Railroad Electrical Construction. *Railway Mechanical Engineer,* v. 121, Nov. 1947, p. 620-621.

Data derived from tests made over a period of years on corrosion resisting materials. In all cases, samples of various metals and alloys were suspended overhead and were removed, examined, cleaned, and weighed at intervals. The materials included various types of aluminum alloys, brass, leaded brass, muntz metal, a wide variety of bronzes, copper, copper-nickel alloy, chromium-nickel alloy, malleable iron, ingot iron, wrought iron, carbon steel (black), carbon steel (galvanized), copper-bearing iron and steel, and chromium-nickel steel.

6-298. The Cracking of Boilers. *Railway Mechanical Engineer,* v. 121, Nov. 1947, p. 642-645.

Results of a study of the nature of cracking at riveted seams and other places in the boiler with some conclusions as to means for dealing with this problem. (Presented at meeting of the Master Boiler Makers' Assoc., Chicago, Sept. 15-18, 1947.)

6-299. Problems in Cathodic Protection. Frank E Dolson. *Journal of the American Water Works Association,* v. 39, Nov. 1947, p. 1079-1086, 1088-1089; discussion, p. 1086-1088.

Problems involved in thus protecting underground water-pipe against corrosion.

6-300. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry,* v. 39, Nov. 1947, p. 87A-88A.

Stress corrosion—one of 8 forms into which corrosion is classified according to appearance of the corroded metal.

6-301. The Theory of the Formation of Protective Oxide Films on Metals. Part III. N. F. Mott. *Transactions of the Faraday Society,* v. 43, July 1947, p. 429-434.

A new mechanism is proposed to account for the formation of oxide films which grow to a limiting thickness. According to this, electrons can pass the film easily, but ions can only penetrate it in the presence of a very strong field. This mechanism is compared with the author's previous theory based on tunnel effect; further experimental work is required to determine which is correct.

6-302. Sodium Chloride Versus Construction Materials. *Chemical Engineering,* v. 54, Nov. 1947, p. 217-218, 220.

Part II of a symposium in which typical materials of construction are evaluated for services involving sodium chloride. High-silicon irons, by Walter A Luce. Carbon, graphite, by L. C. Werking

6-303. Caustic Cracking of Welded Steel Plate. H. M. Wilten. *Metal Progress,* v. 52, Nov. 1947, p. 803-805.

Above type of failure is said to be very rare. Results of an investigation of the failure, including photomicrographs.

6-304. Maintenance of Metallic Trim at Rockefeller Center. Myron Weiss. *Metal Progress,* v. 52, Nov. 1947, p. 833-834.

Experience of ten years with the various metals used.

6-305. Stability of Aerosol Formulations. Edmond G. Young. *Soap and Sanitary Chemicals,* v. 23, Nov. 1947, p. 116-117, 152A.

Technique for comparing stabilities using a standard formulation containing DDT. Table shows the amount of corrosion taking place on a test strip of the metal from a commercial aerosol bomb, after holding at 150° F. for

several weeks, for 32 different compounds used in such formulations.

6-306. Sour Crude Equipment Protection. E. Q. Camp. *Oil and Gas Journal,* v. 46, Nov. 22, 1947, p. 68, 70-71, 73-74. *Petroleum Processing,* v. 2, Dec. 1947, p. 967-972; *Petroleum Refiner,* v. 26, Dec. 1947, p. 100-111.

The major corrosion problems experienced and the methods employed in mitigating them. 25 ref.

6-307. Corrosion. J. C. Hudson. *Iron and Steel,* v. 20, Nov. 1947, p. 507-518.

Work of joint committees of the British Iron and Steel Research Assoc. Atmospheric and marine exposure of different steels with different types of coatings. 23 ref.

6-308. Sour Crude; Equipment Protection for Cracking Units. E. Q. Camp. *Oil and Gas Journal,* v. 46, Nov. 29, 1947, p 83-87.

The corrosion encountered and methods employed in its mitigation. Corrosion experienced in thermal cracking of reduced west Texas crude, in cracking of sour distillate in a fluid-catalyst-cracking unit, and in vapor-phase re-forming of a light naphtha.

6-309. Corrosion Control in Mid-Continent Production. C. C. Munger. *World Oil,* v. 127, Dec. 1947, p. 172, 174, 176, 178.

Types of corrosion, content of corrosive materials in various fields, and methods used to combat it.

6-310. Corrosion Resisting Metals and Alloys. H. J. Butterill. *Canadian Mining and Metallurgical Bulletin,* Nov 1947, p. 521-526.

Electrochemical theory of corrosion; corrosion of structural steel; stainless steels and other high alloys; protective coatings.

6-311. Some Factors Affecting the Corrosion of Packaged Metal Parts. C. G. Lavers, A. H. Woodcock, and J. A. Pearce. *Corrosion and Material Protection,* v. 4, Nov-Dec. 1947, p. 6-10.

The efficiency of intimate wraps and carton overwraps in preventing corrosion of connecting-rod bearing liners of steel faced with a Cu-Pb alloy; of roller-bearing cups of steel with a polished bearing surface; and of push rods (hollow cylindrical steel parts with a polished exterior). Various types of precleaning, grease or oil coating, wax-dipping, coated paper, or fiberboard packing were evaluated.

6-312. Protective Film Formation on Stainless Steels. William H. Colner. *Corrosion and Material Protection,* v. 4, Nov-Dec. 1947, p. 11-21.

Methods of studying oxide films and the data derived therefrom for iron, chromium and nickel and their alloys. Several theories of protection by films; the laws of film growth. Some effects of environment and surface condition. 80 ref.

6-313. Resistance of Aluminum to Corrosion in Solutions Containing Various Anions and Cations. A. B. McKee and R. H. Brown. *Corrosion,* v. 3, Dec. 1947, p. 595-612.

Effect of various anions and cations on the corrosion rate of aluminum and safe concentrations of acids and bases for contact with aluminum of a number of different solutions. (Presented at Annual Meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6-314. Thermogalvanic Corrosion. Part II. R. M. Buffington. *Corrosion,* v. 3, Dec. 1947, p. 613-631; discussion, p. 631.

The subject from a thermodynamic and physicochemical point of view. A test which shows that under certain conditions, the standard thermodynamic relations for reversible systems apply to the open-circuit potentials of thermogalvanic cells. The significance of thermogalvanic data. A method for calculating thermogalvanic potentials from readily available data. 12 ref. (Presented at Annual Meeting of N.A.C.E., Chicago, April 7-10, 1947.)

6-315. Preventing Rectifier Corrosion. D. W. Borst. *Coal Age,* v. 52, Dec. 1947, p 89-93.

The types of corrosion encountered with sealed ignitrons; the effect of potential difference across piping and its elimination; recommended anti-freezes and corrosion inhibitors; electrolytic targets.

6-316. Mechanism of Cathodic Protection. R. B. Mears. *Oil and Gas Journal,* v. 46, Dec. 6, 1947, p. 77, 79-80, 82.

Present theories and laboratory and field methods for determining the current density required for complete protection, especially of pipe lines.

6-317. Corrosion in Boiler Feedwater Treating Systems—Parts II and III. Leo F Collins. *Power Plant Engineering,* v. 51, Nov. 1947, p. 114-116; Dec. 1947, p. 114-116, 132.

Causes of corrosion of cast iron in systems involving zeolites, acids, and degasification. Causes of graphitic corrosion. Performance of materials and metals used in such systems and in primary treating equipment. Recommendations for lines carrying cold, hard, and soft waters.

6-318. Resistance of Sensitized Stainless Steels to Boiling Nitric Acid. Raymond S. Stewart. *Metal Progress,* v. 52, Dec. 1947, p. 971-973.

The Huey test—boiling stainless steel samples in 65% HNO_3 for five 48-hr. periods and determining the

corrosion loss—was originally proposed as a means of evaluating the highly resistant alloys in respect to their general corrosion resistance. In some quarters, however, its use has been extended to appraise the effect of "sensitizing" heat treatments, which induce accelerated intergranular attack. Data show that such an extension is unwarranted and should be discouraged.

6-319. Sodium Chloride Versus Construction Materials. Part III. *Chemical Engineering,* v. 54, Dec. 1947, p. 225-226, 228, 230, 232.

Following articles describe corrosion resistance of the respective materials vs. NaCl brines: nickel, nickel alloys, by W. Z. Friend; protective coatings; rubber lining, by O. S. True; lead, by H. M. Church, Jr.; precious metals, by E. F. Rosenblatt; and tantalum, by Leonard R. Scribner.

6-320. Determination of Physical Chemical Factors in Stress-Corrosion Cracking of Mild Steel. M. G. Winterstein, H. J McDonald, and J. T. Waber. *Welding Journal,* v. 26, Dec. 1947, p. 723s-726s.

A theory of stress corrosion with application to other alloys. In mild steel, stress-corrosion cracking is caused by dissolved nitrogen and by the indirect effects of several other elements. New equipment which permits improved control of variables, rapid testing, automatic records, extrapolation of data to higher temperature, and evaluation of the effect of protective treatments on welded samples. (Presented at 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.)

6-321. Etude sur la Cohesion Intergranulaire des Alliages Al-Zn-Mg. Relations Avec la Corrosion Sous Tension. (Study of Intergranular Cohesion in Al-Zn-Mg Alloys. Relation to Corrosion Under Pressure.) J. Herenguel. *Revue de Metallurgie,* v. 44, March-April 1947, p. 77-81.

The decrease in intergranular cohesion of Al-Zn and Al-Zn-Mg solid solutions was studied at room temperature by means of tensile tests and by mechanical pressure without corrosion. Data thus obtained were compared with mechanical-pressure tests in cases of salt-spray corrosion.

6-322. Effects of Radiation on Materials. A. O. Allen. *U. S. Atomic Energy Commission MDDC 962,* May 20, 1947, 17 p.

Effects of the various types of ionizing radiations on different types of chemical bonds, on simple gases, on organic compounds, on water and aqueous solutions, on metals (corrosion effects), and on other solids. 16 ref.

6-323. Etude de la Corrosion des Creusets en Fonte Utilises Pour la Fusion des Alliages Legers. (Study of Corrosion in Cast Iron Crucibles Used in Melting Light Alloys.) Marcel Bardot. *Fonderie,* no. 21, Sept. 1947, p. 798-810.

A résumé of a bibliographic study preparatory to starting a research project on the above subject. 17 ref.

6-324. Quantitative Evaluation of Intergranular Corrosion of 18-8 Ti. Freeman J. Phillips. *Transactions of American Society for Metals,* v. 39, 1947, p. 891-906; discussion, p. 906-914.

Previously annotated in R.M.L., v. 3, 1946, item 6-121.

6-325. The Corrosion of Rolled Zinc in the Outdoor Atmosphere. E. A. Anderson. *Symposium on Atmospheric Exposure Tests on Nonferrous Metals (American Society for Testing Materials),* 1946, p. 2-14; discussion, p. 15.

Results of exposure of three grades of rolled zinc for 1, 3, 6, and 10 years at each of nine locations. The effects of exposure were evaluated by changes in weight and also by changes in tensile properties.

6-326. The Behavior of Nickel and Monel in Outdoor Atmospheres. W. A. Wesley. *Symposium on Atmospheric Exposure Tests on Nonferrous Metals (American Society for Testing Materials),* 1946, p. 16-24; discussion, p. 25-28, 95-100.

The mechanism of corrosion with respect to both the fogging and later stages of weathering. Weight-loss measurements are shown to be most useful for high-Ni alloys. 11 ref.

6-327. Resistance of Copper Alloys to Atmospheric Corrosion. A. W. Tracy. *Symposium on Atmospheric Exposure Tests on Nonferrous Metals (American Society for Testing Materials),* 1946, p. 29-43; discussion, p. 44-45.

Data obtained from the tests carried out by Subcommittee VI on Atmospheric Corrosion of Committee B-3.

6-328. The Use of Lead and Tin Outdoors. George O. Hiers. *Symposium on Atmospheric Exposure Tests on Nonferrous Metals (American Society for Testing Materials),* 1946, p. 46-55; discussion, p. 56, 95-100.

Comments on reports of Subcommittee VI on Atmospheric Corrosion of A.S.T.M. Committee B-3 which discuss the behavior of lead, 1% antimonial lead, and tin as judged by tests made periodically of specimens exposed to the atmosphere at various locations in the United States. Results indicate suitability for use on the exteriors of permanent structures.

6-329. The Resistance of Aluminum-Base Alloys to Atmospheric Exposure. E. H. Dix, Jr., and R. B. Mears. *Symposium on Atmospheric Exposure Tests on*

Nonferrous Metals (American Society for Testing Materials), 1946, p. 57-71; discussion, p. 72-75, 95-100.

Test results from exposure of aluminum-base alloy specimens in atmospheric corrosion tests conducted by the A.S.T.M. through Subcommittee VI on Atmospheric Corrosion, of Committee B-3 on Corrosion of Non-Ferrous Metals and Alloys. Atmospheric-exposure tests conducted by the Aluminum Research Laboratories with similar and additional aluminum alloys.

6-330. **Tracking Troubles in Atmospheric Corrosion Testing.** P. S. Olmstead, W. E. Campbell, and H. G. Romig. *Symposium on Atmospheric Exposure Tests on Nonferrous Metals (American Society for Testing Materials)*, 1946, p. 76-88; discussion, p. 89-100.

Demonstrates graphically that thorough mixing of test specimens was not always achieved. Some of the peculiarities previously noted in certain of the data and how statistical methods may be used to assist in their interpretation. Recommendations for planning future tests.

6-331. **Appendix.** *Symposium on Atmospheric Exposure Tests on Nonferrous Metals (American Society for Testing Materials)*, 1946, p. 101-111.

Original photomicrographs of samples from the 1932 report; 10-yr. exposure results from the 1943 report; and 10-yr. exposure results from the 1944 report.

6-332. **Report of Committee A-5 on Corrosion of Iron and Steel.** *American Society for Testing Materials Proceedings*, v. 46, 1946, p. 144-167.

Recommendations for changes in specifications and in test methods; also subcommittee reports on inspection of copper-bearing and noncopper-bearing corrugated black sheets exposed at Annapolis, Md., for one year; and on field tests of galvanized sheets, metallic-coated hardware; wire, and wire products. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

6-333. **Report of Committee A-10 on Iron-Chromium, Iron-Chromium-Nickel and Related Alloys.** *American Society for Testing Materials Proceedings*, v. 46, 1946, p. 171-179.

Recommendations for changes in test procedures and specifications are followed by two appendices—Report on Passivation of Corrosion-Resistant Steels, by F. L. LaQue (results of a survey); and Report on the Inspection of the Corrosion-Resisting Steel Deck Houses on the U. S. Navy Destroyers Farragut and Alwyn, by H. A. Grove. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

6-334. **Report of Committee B-3 on Corrosion of Nonferrous Metals and Alloys.** *American Society for Testing Materials Proceedings*, v. 46, 1946, p. 194-197.

Recommendations for changes in test methods. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

6-335. **Report of Committee B-6 on Die-Cast Metals and Alloys.** *American Society for Testing Materials Proceedings*, v. 46, 1946, p. 222-258.

Recommendations for changes in specifications and reports of three subcommittees. Test results on atmospheric exposure of two aluminum alloys (8% Mg, 92% Al; and 9.5% Si, 0.5% Mg, 90% Al) at Sandy Hook, N. Y., and New York City, for one year. Data on creep testing of tin and lead alloys. Final report on 15-yr. exposure of Al and Zn-base alloys at five outdoor and four indoor sites. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

6-336. **Diffusion in R301 Alloy and Its Effect on the Corrosion Resistance.** L. F. Mondolfo. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division)*, 1946, p. 229-241; discussion, p. 241.

Previously annotated from *Metals Technology*, Dec. 1945, T.P. 1940, in R.M.L., v. 3, 1946.

6-337. **Rates of High-Temperature Oxidation of Magnesium and Magnesium Alloys.** T. E. Leontis and F. N. Rhines. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division)*, 1946, p. 265-292; discussion, p. 292-294.

Previously annotated from *Metals Technology*, June 1946, T.P. 2003 in R.M.L., v. 3, 1946.

6-338. **Atmospheric Corrosion Tests on High-Chromium Steels.** W. O. Binder and C. M. Brown. *American Society for Testing Materials Proceedings*, v. 46, 1946, p. 593-608; discussion, p. 609; also *Symposium on Atmospheric Weathering of Corrosion-Resistant Steels (American Society for Testing Materials)*, 1947, p. 1-16; discussion, p. 17.

Data on atmospheric corrosion tests, based on the weight-loss method, for low-carbon, 0 to 18% Cr steels conducted at Kure Beach, N. C., Niagara Falls, N. Y., and New York, N. Y. The data show a progressive improvement in atmospheric corrosion resistance with increasing chromium content and indicate that an addition of 18% Cr is required to make the steels virtually stainless in the atmospheres tested.

Tension-test specimens of cold-rolled austenitic steels of the types used in modern light-weight construction were exposed at Niagara Falls for 5 years with no change in strength or ductility. The influence of stress on cold-rolled austenitic steels was also investigated at Amagansett, L. I., N. Y., and it was found that the presence of stress did not reduce resistance to marine atmospheric corrosion. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

6-339. Corrosion-Resistant Steel for Architectural and Structural Applications. H. A. Grove. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 610-613; discussion, p. 614-617; also *Symposium on Atmospheric Weathering of Corrosion Resistant Steels (American Society for Testing Materials),* 1947, p. 18-21; discussion, p. 22-25.

Results of inspections of installations at the Chrysler and Empire State Buildings, New York, N. Y.; The Philadelphia Saving Fund Society Building, Philadelphia, Pa.; several building fronts along the boardwalk at Atlantic City, N. J.; and also a Budd corrosion resistant steel train which had been in service for several years. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

6-340. Atmospheric Corrosion Tests for Corrosion Resistant Steel Wires. A. P. Jahn. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 618-620; also *Symposium on Atmospheric Weathering of Corrosion Resistant Steels (American Society for Testing Materials),* 1947, p. 26-28.

Nature and results of atmospheric corrosion tests on wire and wire-product specimens of corrosion-resistant steel after exposure for about 9 years at test sites of various types, including severely industrial, mildly industrial, seacoast, and rural. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

6-341. Corrosion Resistant Steel Sheet in Marine Atmospheres. Willard Mutchler. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 621-639; discussion, p. 640-641; also *Symposium on Atmospheric Weathering of Corrosion Resistant Steels (American Society for Testing Materials),* 1947, p. 29-47; discussion, p. 48-49.

Thin corrosion resistant steel sheets were exposed for periods up to 3 years at Hampton Roads, Va., Kure Beach, N. C., and Chapman Field, Fla. Information was obtained regarding effects upon corrosion of factors such as the presence of small quantities of stabilizing elements in steels containing approximately 18% Cr and 8% Ni, locality of exposure, shot welding, surface finishes and treatments, and contact with light-metal alloys. Behavior of duplicate panels exposed intermittently or continuously in sea water. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

6-342. Atmospheric Corrosion Tests on Corrosion Resistant Steel. Grant L. Snair, Jr. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 642-651; also *Symposium on Atmospheric Weathering of Corrosion Resistant Steels (American Society for Testing Materials),* 1947, p. 50-59.

Results of tests in which specimens of "stainless" steel alloys were continually exposed to a severely corrosive industrial atmosphere for approximately ten years. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

6-343. Weathering Behavior of Corrosion Resistant Steel Insect Screens. W. A. Wesley and H. R. Copson. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 652-665; discussion, p. 666-672; also *Symposium on Atmospheric Weathering of Corrosion Resistant Steels (American Society for Testing Materials),* 1947, p. 60-73; discussion, p. 74-80.

Results of several series of tests are presented in which commercially woven, wire-cloth screens of bronze, 18% Cr, 8% Ni corrosion resistant steel, and Type 316 corrosion resistant steel were exposed in sulphurous, industrial, marine, and rural atmospheres. It is shown that the atmospheric corrosion of wire cloth is influenced greatly by the manner in which the cloth is exposed, or by the degree of shelter from the rinsing action of rain. Certain conclusions are drawn, although some of the tests will not mature for years. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

6-344. Results of 15 Years' Exposure Tests on Corrosion Resistant Steels. I. V. Williams and K. G. Compton. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 673-677; also *Symposium on Atmospheric Weathering of Corrosion Resistant Steels (American Society for Testing Materials),* 1947 p. 81-85.

The results of the exposure of ten corrosion resistant steels to New York City atmospheres for 15 yr. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

6-345. Resistance of Iron-Nickel-Chromium Alloys to Corrosion in Air at 1600 to 2200° F. Anton DeS. Brasunas, James

T. Gow, and Oscar E. Harder. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 870-893; discussion, p. 894-901; also *Symposium on Materials for Gas Turbines (American Society for Testing Materials),* 1946, p. 129-152; discussion, p. 153-160.

Results of tests on a series of Fe-Ni-Cr alloys with reference to their resistance to corrosion in air at temperatures of 1600, 1800, 2000 and 2200° F. Apparatus and experimental procedure. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

6-346. General Corrosion and Stress-Corrosion of Spot Welded Magnesium Alloy Sheet. W. F. Hess, T. B. Cameron, D. J. Ashcraft and R. A. Wyant. *Welding Journal,* v. 27, Sept. 1947, p. 539s-544s.

Unstressed spot welds in magnesium alloy sheet are not greatly affected by selective corrosion attack unless copper is transferred from the electrode. Stressed spot welds are subject to stress-corrosion. Stressing the welds for considerable periods before subjecting them to corrosive conditions improved resistance to stress-corrosion. 13 ref.

SECTION VII

CLEANING AND FINISHING

7-1. Some Facts About Aluminum Finishes. *Modern Metals,* v. 2, Dec. 1946, p. 10-12.

Function of a finish and type of finish for specific applications. Brief review of the various tests for finishes.

7-2. Car Finishes Improved by Direct-Fired Ovens. *Production Engineering & Management,* v. 18, Dec. 1946, p. 62-64.

Conveyerized direct-fired ovens at Dodge Division reduce salvage and accomplish better control of improved body finishes.

7-3. A New Chemical Coating to Protect Metals. *Chemical Industries,* v. 59, Dec. 1946, p. 1001.

Development and application of a unique polyvinylbutyral resin-phosphoric acid wash primer for reduction of atmospheric corrosion losses.

7-4. Steel Wire and Rope Manufacture. *Wire Industry,* v. 13, Dec. 1946, p. 677-678.

German methods of steel wiredrawing and rope manufacture of Felten and Guileaume at Köln-Mülham. Rod cleaning house in these mills consisted of three hydraulically operated swiveling cranes, each with six vats containing the usual sulphuric acid, water and lime wash solutions set around in a circular fashion. There was no system for agitating the acid baths; development of a substitute coating for lime or cleaning methods other than pickling had apparently received no attention.

7-5. Cleaning and Finishing Aluminum Products. Tom Winshurst. *Industrial Finishing,* v. 23, Dec. 1946, p. 32-34, 36, 38.

Reynolds Metals' setup for conveyerized spray painting followed by infrared baking as applied to a wide range of aluminum products finished in different colors.

7-6. Essentials to Good Spray Finishing. Frederick M. Crewdson. *Industrial Finishing,* v. 23, Dec. 1946, p. 40, 42, 44, 46, 48, 50.

Points to consider in the selection use and cleaning of spray guns; some reasons for bad performance; necessity of clean air from the compressor, correct pressure of air; room cleanliness and good lighting.

7-7. Mechanized, Painting and Infrared Drying Setup. *Industrial Finishing,* v. 23, Dec. 1946, p. 70, 73, 74, 76.

Conveyerized setup includes a three-stage chemical cleaning, a mist coat followed by a full spray coat of white enamel, and finally a 6-min. drying in dual heat infrared oven which was custom built especially for job.

7-8. Machines and Auxiliary Equipment for Buffing and Polishing. John E. Hyler. *Steel,* v. 119, Dec. 30, 1946, p. 68-69, 112.

Standard buffers and polishers and special mechanisms for varying speed, etc. Dust collecting systems. (To be continued.)

7-9. Chromates in Metal Protective Paints. Hans Wagner. *Paint, Oil & Chemical Review,* v. 109, Dec. 12, 1946, p. 49-50.

Improvement of priming paints by use of small percentages of chromates was the subject of extensive German research. Numerous steel panels were painted, using various paint formulations, and given outdoor exposure tests. Results are outlined. (Abstract from *Farben Zeitung,* v. 47, 1942, p. 177, 179, 187-189.)

7-10. Ford Motor Co. Extends Use of Phosphate Coating Process for Passenger Cars. Part II. *Industrial Heating,* v. 13, Dec. 1946, p. 2025, 2028, 2030, 2032, 2034.

Prime-coat painting operations, including the use of infrared heating for drying before and after painting.

7-11. Aluminum Films. *Chemical Engineering,* v. 53, Dec. 1946, p. 270.
Properties, appearance and thickness of aluminum films obtained by anodic oxidation of different aluminum alloys. (Digest of paper from *Rev. Metall.,* v. 42, 1945, p. 72-78; *Chimie et Industrie,* v. 56, v. 34, no. 1, p. 34.)

7-12. Finishes for Magnesium. R. T. Wood. *Light Metal Age,* v. 4, Dec. 1946, p. 14-17, 28.
Mechanism of corrosive attack on magnesium alloys and the reason why the subject of protective and decorative finishes has received so much attention. Chemical treatments and coatings commonly used in the United Kingdom, Germany, and the United States.

7-13. Recherche Rapide des Conditions de Polissage Electrolytique d'un Métal. (Rapid Determination of Conditions for Electrolytic Polishing of Metals.) F. Bertin. *Métaux et Corrosion,* v. 21, March 1946, p. 40-43.
Several methods for the determination of optimum conditions for electrolytic polishing of different metals.

7-14. Rusting and Painting Trouble Corrected. F. A. Westbrook. *Industrial Finishing,* v. 23, Dec. 1946, p. 82, 84.
Solution of problem in connection with the finishing of 8-in. pressed steel shells for commercial product filters. Trouble arose when the company was relying upon four outside concerns to manufacture steel shells for its filters.

7-15. Metal Polishes. Milton A. Lesser. *Soap and Sanitary Chemicals,* v. 22, Dec. 1946, p. 147, 149, 151, 153.
Compounding formulas and directions for 26 different preparations, together with instructions concerning their use and applicability. 26 ref.

7-16. Discussion of Porcelain Enamel Defects. A. I. Andrews. *Finish,* v. 4, Jan. 1947, p. 26, 56.
Metal defects; process and design defects; process and enamel defects.

7-17. A Completely Conveyerized Plant for Stove Work and Jobbing. Gerald E. Stedman. *Finish,* v. 4, Jan. 1947, p. 15-18, 32, 33, 62.
Plant and equipment at Brown Stove Works.

7-18. Metallizing Glass and Ceramic Materials. A. J. Monack. *Glass Industry,* v. 28, Jan. 1947, p. 21-25, 40, 42-44.
Purposes and fundamentals of metallizing; mechanical films; metallic paints; metal spraying; cathode sputtering and metal evaporating; chemical reduction films; electroplating; theoretical aspects.

7-19. Principles of Immersion and Humidity Testing of Metal Protective Paints. A. C. Elm. *ASTM Bulletin,* Oct. 1946, p. 9-27.
Round-table discussion on problems encountered in testing for the humidity and immersion resistance of paints on steel. Reproducibility of tide range exposures; effects of nonuniform surface preparation; surface conditions wanted on steel panels; surface cleaning procedures.

7-20. Aluminum Cleaning Must Be Engineered. Don Vance. *Automotive and Aviation Industries,* v. 96, Jan. 1, 1947, p. 22, 82.
Removal of soils imbedded during the process of manufacture, such as from drop hammers, rollers and heat treating, and others caused by grease and oils, paints and dyes.

7-21. Conveyerizing Finishing Processes. Part I. John E. Hyler. *Organic Finishing,* v. 7, Dec. 1946, p. 15-21.
Layout of conveyer systems used in finishing operations. (To be continued.)

7-22. Finishing Aluminum. Part II. Rick Mansell. *Organic Finishing,* v. 7, Dec. 1946, p. 23-29.
Anodizing, the Alumilite process, chromating and phosphating. (To be continued.)

7-23. Using Abrasive Belts for Buffing and Polishing. John E. Hyler. *Steel,* v. 120, Jan. 13, 1947, p. 84-85, 109.
Some applications and advantages of abrasive belts. (To be concluded.)

7-24. Correct Maintenance and Use of Manual Spray Equipment. Frank V. Faulhaber. *Products Finishing,* v. 11, Jan. 1947, p. 24-26, 28, 30, 32, 34.
Spray guns; their use with various materials; proper methods of cleaning them.

7-25. Preparing Iron and Steel for Bright Zinc Plating. Arthur P. Schulze. *Products Finishing,* v. 11, Jan. 1947, p. 46-48, 50, 52, 54, 56, 58.
Four techniques are: still or soak tank, using either an alkaline material or an emulsifying solvent, either separately or in combination as a two-bath process; electrocleaning tank, employing direct or reverse current; automatic mechanical washing machine of the fixed spray, revolving wash arm, rotary drum and splashing or cascade types, using alkaline degreasing materials; combination of one of these methods with another, depending upon individual plant conditions.

7-26. Barrel Finishing of Metal Products. Part V. H. Leroy Beaver. *Products Finishing,* v. 11, Jan. 1947, p. 62-64, 66, 68, 70, 72.
Development of the tubbing machine.

7-27. Electropolishing. C. L. Faust. *Metal Industry,* v. 69, Dec. 20, 1946, p. 512-513.

Status of electropolishing as a metal finishing process.

7-28. Effect of Lead in Hot Dip Galvanizing Baths. W. G. Imhoff. *Iron Age,* v. 159, Jan. 9, 1947, p. 46-49.

Varied effects of lead in hot dip galvanizing baths. An adequate lead content produces many beneficial effects, such as giving a thin, fluid bath and smoother and more lustrous coatings. Sources of lead in spelter; cites several instances in which lead additions served to correct some galvanizing difficulties.

7-29. Structure of Aluminum Anodic Films, Formed in Oxygen Gas Discharge. P. D. Dankov and D. V. Ignatiev. *Reports of Academy of Sciences of U.S.S.R.,* v. 54, no. 3, 1946, p. 235-238. (In Russian.)

During investigation of the structure of anodized aluminum surfaces, difficulty was encountered in determination of results of the primary process of oxidation because of the secondary reaction of oxide with different constituents of the bath To avoid this difficulty, a very thin layer of aluminum condensed from aluminum vapors on mica plate in vacuum and then detached was anodized.

7-30. Anodic Oxidation. J. Hérenguel and R. Segond. *Metal Industry,* v. 70, Jan. 3, 1947, p. 3-5.

A method of constructing three-dimensional curves of current density-temperature-film thickness to derive the limiting conditions of bath operation to obtain successful anodic films on pure aluminum and its alloys. (Paper presented to the Société Francaise de Métallurgie.)

7-31. Tinning Cast Iron. *Iron Age,* v. 159, Jan. 16, 1947, p. 44-45.

Procedures for tinning cast iron by use of the new fused salt baths. Process is said to result in better adhesion than the older methods and to give smoother and more continuous coatings.

7-32. Technical Developments of 1946. Richard A. Mozer. *Metal Finishing,* v. 45, Jan. 1946, p. 50-55, 95-99.

General review covering theory; anodizing; corrosion prevention; polishing; cleaning; abrasive blasting; pickling; coatings; electroforming and metallizing nonconductors; metal coloring; testing; and miscellaneous. 210 ref.

7-33. Color Control for Aluminum Dyeing. E. Rhael and F. P. Summers. *Metal Finishing,* v. 45, Jan. 1947, p. 64-65.

Use of organic dyestuffs for coloring anodized aluminums. Plant procedures and control techniques.

7-34. Buffing and Polishing. John E. Hyler. *Steel,* v. 120, Jan. 20, 1947, p. 84, 87-88.

Some of the more dependable techniques now being employed in high speed production.

7-35. Firing Ground Coat and Cover Coat Ware Together. J. T. Irwin. *Enamelist,* v. 24, Jan. 1947, p. 4-7.

Soft ground coats can be used on all production items handled in Clyde Porcelain Steel Corp., and there are definite advantages in flexibility of production, greater production, lower fuel costs and less warpage, when using such ground coats. (Presented at the Eighth Annual Forum of the Porcelain Enamel Institute, Inc., Oct. 1946.)

7-36. Can We Porcelain Enamel Stainless Steel? W. J. Plankenhorn. *Enamelist,* v. 24, Jan. 1947, p. 8-11.

Typical analyses of several types of stainless steel as compared to commercial enameling iron. Cites some recent experiments and lists advantages gained where stainless steel is used for porcelain enameling to replace regular enameling iron.

7-37. Rubber Linings Protect Steel Against Corrosion and Abrasion. O. S. True. *Product Engineering,* v. 18, Jan. 1947, p. 142-148.

Properties of rubber in protecting cast iron and steel surfaces from the corrosive attack of gaseous and liquid chemicals, including preparation of metal surfaces and design considerations that facilitate applying rubber linings and coatings to tanks, pipe, fittings, fans and pump impellers.

7-38. Time and Costs Cut by New Diamond Polishing Compound. *Production Engineering & Management,* v. 19, Jan. 1947, p. 108.

A number of features in which it excels, and applications in the field of precision manufacture.

7-39. A Method for Improving the Adhesion of Sprayed Metal to Blasted Surfaces. *Metco News,* v. 3, Jan. 1947, p. 12-14.

Use of a low-carbon steel undercoat makes it possible to use finer abrasives, giving lower blasting costs for any given bond strength. Comparative test results presented.

7-40. Finishing Toy Trains. Floyd McKnight and Joseph G. Cowley. *Organic Finishing,* v. 8, Jan. 1947, p. 15-22.

Precleaning treatment; equipment and operations involved in actual cleaning and metal preparation at Lionel Corp. (To be continued.)

7-41. Finishing Aluminum. (Concluded.) Rick Mansell. *Organic Finishing,* v. 8, Jan. 1947, p. 22-28, 46.

Organic coatings; chemical finishes; mechanical finishes.

7-42. Conveyerizing Finishing Processes. Part II. John E. Hyler. *Organic Finishing*, v. 8, Jan. 1947, p. 37-43.

Equipment for conveyerized dipping operations and for automatically spraying various types of work.

7-43. Ceramic Coatings for Steel in High-Temperature Service. William N. Harrison, Dwight G. Moore, and Joseph C. Richmond. *Better Enameling*, v. 18, Jan. 1947, p. 6-10.

Extracts from report by National Bureau of Standards on development and testing of special heat resistant ceramic coatings for low-carbon steels and supplementary information on service tests, compositions and the use of the coatings in production of parts for the armed services.

7-44. On the Mechanism of Metal Cleaning. Samuel Spring and Louise F. Peale. *Metal Progress*, v. 51, Jan. 1947, p. 102-106.

Direct visual and photographic observations were made of the process of oil removal from metal.

7-45. The Dyeing of Anodized Aluminum. J. P. Gill. *Journal of the Electrodepositors' Technical Society Reprint*, v. 21, 1946, p. 235-244.

Methods of dyeing anodized aluminum with particular reference to the dyestuffs used, and to the effect of variables on the dyed shade.

7-46. Galvanized Steel Wire. Fred M. Crapo. *Wire and Wire Products*, v. 22, Jan. 1947, p. 31-42.

The development and present status of wire galvanizing processes. 81 ref.

7-47. For Quality, We Chose Modern Finishing Methods. L. A. Brown. *American Machinist*, v. 91, Jan. 30, 1947, p. 77-81.

Reconversion program involved the substitution of automatic spray pickling for the usual vat method; conveyerized porcelain enameling plant; and completely new spray bonderizing unit, air conditioned spray room and equipment for white synthetic enamel.

7-48. Improvements in Tinning. Howard C. Rodgers. *Iron and Steel Engineer*, v. 24, Jan. 1947, p. 65-66.

Advantages of vacuum feeding and electrolytic pickling in the tinning operation.

7-49. Observations on Some Surface Properties of Vitreous Enamels. W. E. Benton. *Foundry Trade Journal*, v. 81, Jan. 2, 1947, p. 11-16.

Problems that connect practical ease of cleaning and satisfactory appearance with the constitution and form of an enamel surface.

7-50. Formation and Application of Phosphate Coatings. Van M. Darsey and Walter R. Cavanagh. *Electrochemical Society Preprint* 91-1, 1947, 14 p.

The evolution of phosphate coating metals; use of metal accelerators and suitable oxidizing agents in the phosphating solution expedited the coating formation and made possible the production of paint base coatings on metals within 2 to 5 min. Combining spray application with such accelerated phosphate solutions containing an oxidizing agent further reduced the coating time to as low as 2 to 10 sec. Application to various metals.

7-51. Problems in Porcelain Enameling Nonenameling Sheets. W. A. Deringer. *Steel Processing*, v. 33, Jan. 1947, p. 26-32.

Structural difference between killed and rimmed steel. The various problems encountered in enameling and their solutions. Contrary to past beliefs, the addition of small amounts of titanium to the steel has been found beneficial for enameling operations. 8 ref.

7-52. Finishes for Magnesium. R. T. Wood. *Aluminum and Magnesium*, v. 3, Jan. 1947, p. 12-14, 17, 22.

Surface preparation and cleaning; treatments used as preparation for painting; paint systems. Some of the comparatively hard, decorative or special purpose coatings made by chemical treatment.

7-53. Influence of Various Additions in the Phosphating of Metals. II. Influence of Additions of Nitrates of the Univalent Metals. I. I. Hain. *Journal of Applied Chemistry (U.S.S.R.)*, v. 19, no. 5 and 6, 1946, p. 527-534. (In Russian.)

Influences on acidity of the phosphating solution, duration of gas formation, structure, color, and corrosion resistance of the coating.

7-54. The Fabrication and Porcelain Enameling of Formed Metal Plumbing Ware. J. W. Sampson and S. E. Hempsteger. *Finish*, v. 4, Feb. 1947, p. 13-16, 30.

Units include bathtubs, lavatories and kitchen sinks in a range of sizes and shapes. Equipment and procedures for pickling and spraying.

7-55. A Visit to Columbus Porcelain Metals Corp. Dana Chase. *Finish*, v. 4, Feb. 1947, p. 28, 52.

Operations at small box furnace jobbing plant.

7-56. High-Temperature Protection for Mild Steels. William N. Harrison, Dwight G. Moore and Joseph C. Richmond. *Steel*, v. 120, Feb. 10, 1947, p. 92-93, 120, 122.

Newly developed ceramic coatings feature high resistance to chipping under repeated thermal shock and protection of metal against oxidation during prolonged exposure to temperatures up to about 1250° F. Refractory properties of ground coat frits tested on aircraft exhaust systems improved with 20% admixture of alumina.

7-57. Lime Treatment of Waste Pickle Liquor. Richard Hoak, Clifford J. Lewis, Charles J. Sindlinger and Bernice Klein. *Industrial and Engineering Chemistry*, v. 39, Feb. 1947, p. 131-135.

Methods for attaining satisfactory results with the less reactive, but more readily available, dolomitic lime.

7-58. New Enameling System. *Steel*, v. 120, Feb. 17, 1947, p. 92-93, 128.

Cuts oven travel-time 50% for Dodge in applying better auto body finishes.

7-59. Special Finishing Installation Eliminates Production Problem. E. L. Verhagen. *Products Finishing*, v. 11, Feb. 1947, p. 70-72.

How specially designed "double-heat" infrared oven, with unusual contour and employing rows of lamps set at criss-cross angles, reduced required baking time from 30 to 8 min. in finishing of wall-type can openers.

7-60. Electropolishing with Fluosulphonic Acid. C. B. F. Young and Kenneth R. Hesse. *Metal Finishing*, v. 45, Feb. 1947, p. 63-67, 84.

Investigation to determine whether or not fluosulphonic acid could be used as an electropolishing agent for stainless steels, plain carbon steels and various nonferrous metals. Systems formed by using fluosulphonic acid in conjunction with the following were investigated: phosphoric, sulphuric, chromic, acetic, and perchloric acids. Among the characteristics of the solutions investigated for bright polishing were current density limits; temperature stability of the solutions; chemical stability of the solutions; and optimum time of polish. (To be continued.)

7-61. Porcelain Enamels for Machine Parts. R. L. Fellows. *Machine Design*, v. 19, Feb. 1947, p. 147-150.

Recently developed enamels and improved methods of processing.

7-62. Ferro Enamel Corp. Opens L. A. Plant. *Western Metals*, v. 5, Feb. 1947, p. 24-27.

Pictures, with explanatory notes.

7-63. Recent Developments in Molybdenum Enamels. B. J. Sweo. *Enamelist*, v. 24, Feb. 1947, p. 4-6.

Chief advantage is that they provide a one-coat white finish which will adhere to steel.

7-64. Quality Enameling in "American Kitchens". *Ceramic Industry*, v. 48, Feb. 1947, p. 44-50.

Details of procedures and equipment used in production of enameled kitchen units by American Central Division of Aviation Corp., Connersville, Ind.

7-65. Problems in Porcelain Enameling Nonenameling Sheets. Part II. W. A. Deringer. *Ceramic Industry*, v. 48, Feb. 1947, p. 51-52.

Possible cures or antidotes for defects and troubles.

7-66. Metallizing by the Wire Process. *Sheet Metal Worker*, v. 38, Feb. 1947, p. 92-93.

7-67. The Color Anodizing of Aluminum. G. T. Colegate. *Metal Treatment*, v. 13, Winter 1946-1947, p. 248-264.

Various anodizing methods available, the dyes and other pigments used and practical control of the processes.

7-68. The Structure and Appearance of Metal Surfaces. J. H. Nelson. *Metal Treatment*, v. 13, Winter 1946-1947, p. 279-285.

Effect of surface defects of various magnitudes on the surface appearance of metallic objects. Particular attention to the process of "superfinishing".

7-69. The Protection of Steel by Tin and Tin-Alloy Coatings. *Metal Treatment*, v. 13, Winter 1946-1947, p. 286-289.

Comment on article by E. S. Hedges and W. E. Hoare, "Some New Aspects of the Protection of Steel by Tin and Tin-Alloy Coatings", with reply by the authors.

7-70. Airless Blasting Breaks Bottlenecks in Cleaning. Carl Zinnow. *Machine and Tool Blue Book*, v. 43, Feb. 1947, p. 151-152, 154, 156, 158, 160, 162, 164.

Fundamentals of airless blasting. Increased production and lowered manufacturing costs result from its utilization.

7-71. Measurement and Control of Interlaminar Resistance of Laminated Magnetic Cores. R. F. Franklin. *ASTM Bulletin*, Jan. 1947, p. 57-61.

Instrument was developed to test under simulated operating conditions insulating films applied to sheet steel in order to determine whether they are adequate and to make possible a practical method of quality control of their applications. Useful not only for quality control of the application of enamel and oxide films to sheet steel but also for studying the effectiveness of these films under various operating conditions and when applied in various manners.

7-72. Electrostatic Spraying of Steel Wall Panels. W. S. Reed. *Materials & Methods*, v. 25, Feb. 1947, p. 77-79.

Equipment and procedures in the application of finish coats by electrostatic spraying and infrared drying.

7-73. Ceramic Coatings for Steel in High Temperature Service. William N. Harrison, Dwight G. Moore, and Joseph C. Richmond. *Finish*, v. 4, Feb. 1947, p. 21-24, 56; *Ceramic Age*, v. 49, Jan. 1947, p. 13-16.

Development of new coating having outstanding properties for the exhaust

systems of aircraft and other vehicles. (Condensed from paper to appear in *Journal of Research of the National Bureau of Standards*, v. 38, March 1947.)

7-74. Enamel Spraying Technique. A. J. Biddulph. *Foundry Trade Journal*, v. 81, Feb. 6, 1947, p. 133-135.

Equipment needed; spray guns; types of gun; containers; spray booth; exhaust and dust extraction; operating details; recent developments; and electrostatic spray. (Paper presented to the Institute of Vitreous Enamellers.)

7-75. Anodizing of Magnesium. D. Gardner Foulke. *Modern Metals*, v. 3, Feb. 1947, p. 22-24.

The advantages of surface treatment; the Manodyz process; physical and chemical properties of the film; prior treatment; subsequent corrosion resistance; dye coloring magnesium.

7-76. The Chemical Basis of Pickling. Heinz Bablik. *Sheet Metal Industries*, v. 24, Feb. 1947, p. 307-308.

Importance of diffusion and peptization. Effect of inhibitors. Influence of salts.

7-77. Developments in the Use of Tin as a Protective Metal. Ernest S. Hedges. *Sheet Metal Industries*, v. 24, Feb. 1947, p. 311-318.

Contributions of British research on tin and the effect on various tin-consuming industries. Studies on corrosion, the development of new tinning processes including "Protecta-tin", new alloys such as the tin-zinc alloys and speculum.

7-78. Flame Spraying by the Powder Pistol. W. D. Jones. *Sheet Metal Industries*, v. 24, Feb. 1947, p. 375-382.

Conditions governing the process and the various metallic and nonmetallic protective coatings which are commonly applied in this way.

7-79. The Properties of Porcelain Enamel and Their Effect Upon Enamelware. Part I. H. D. Carter, B. W. King and H. C. Draker. *Finish*, v. 4, March 1947, p. 19-24, 56.

General procedure for investigation of kitchenware frits. Thermal shock and impact results on cover-coat and ground-coat expansion. Tables and graphs.

7-80. A New Canadian Enameling Plant for Sanitary Ware and Jobbing. A. T. Getz. *Finish*, v. 4, March 1947, p. 25-27, 58.

Plant designed to produce 50% sanitary ware and 50% general jobbing work. Imported partially fabricated bathtubs and sinks are completed and porcelain enameled.

7-81. Investigations of the Lapping Process. Part I. F. Eugene. *Industrial Diamond Review*, v. 7, Feb. 1947, p. 35-40.

Experimental equipment, procedure, and results. A special machine was built which permits factors such as speed of lap, pressure in test piece, and relative movement between lap and test piece, to be varied independently of each other. (To be continued.) (Translated from *Travaux et Memoirs du Laboratoire Central des Industries Mecaniques*, v. 2, 1945, p. 9-33.)

7-82. Good Galvanizing Practice Results in Long Pot Life. Wallace G. Imhoff. *Industrial Gas*, v. 25, Feb. 1947, p. 7-9, 22, 24.

Operations at San Francisco Galvanizing Works. Good results obtained from scientific furnace design, skilled engineering, good operating hot-dip galvanizing practice.

7-83. Electricity Coats Radio Tubes at R.C.A. Victor. Joseph G. Cowley. *Organic Finishing*, v. 8, Feb. 1947, p. 9, 11-13, 15-17.

Equipment and operation at the R.C.A. Victor plant involved in electrostatic spraying of radio tubes.

7-84. Surface Treatments for Magnesium Alloys. Part I. Rick Mansell. *Organic Finishing*, v. 8, Feb. 1947, p. 19-24.

Cleaning and pickling operations. (To be concluded.)

7-85. Conveyerizing Finishing Processes. (Conclusion.) John E. Hyler. *Organic Finishing*, v. 8, Feb. 1947, p. 33, 36-41.

Various types of conveyers and methods of mounting spray guns.

7-86. Cleaning Room Practice. Milton P. Schemel. *American Foundryman*, v. 11, Feb. 1947, p. 56-58.

An account of practice at Symington-Gould Co. where castings are sent through the finishing department in the following sequence of operations: flogging, burning, normalizing, sandblasting, chipping, welding, grinding, final chipping and, finally, placing on the selling rails.

7-87. Factors Affecting Orange Peel. John J. Steencken. *Journal of the American Ceramic Society*, v. 30, Feb. 1, 1947, p. 64-68.

Effects of spraying techniques on orange-peel surface of porcelain enamel. Volume of atomizing air per unit volume of atomized slip is the predominating factor. Conclusions and recommendations.

7-88. Metallizing of Spherical Surfaces. C. B. Christopher *Welding Engineer*, v. 32, March 1947, p. 62-63.

Technique developed by the Soo Line to return battered booster balls for locomotives to service by coating with stainless steel.

7-89. Metal Diffusion. (Concluded.) *Iron and Steel*, v. 20, Feb. 1947, p. 47-48.

Chromizing at Krupps and German wartime practice.

7-90. Flame Spraying by Powder Pistol. W. D. Jones. *Foundry Trade Journal,* v. 81, Feb. 13, 1947, p. 157-158, 161.

Advantages of the Schori pistol in spraying zinc, aluminum, synthetic rubber, shellac and plastics.

7-91. Anticorrosive Pigments. *Paint Manufacture,* v. 17, Feb. 1947, p. 55-57.

Discussion of pigments used in paints for protection of steel surfaces, at a meeting of the London Section of the Oil and Colour Chemists' Association on Nov. 13, 1946.

7-92. Diamond Powder Increases Polishing Efficiency. *Iron Age,* v. 159, March 13, 1947, p. 51.

Elgin-processed powder is said to contain fewer fines, oversized flakes have been eliminated, and a closer range of particle sizes is apparent. Advantages claimed include more uniform cutting and polishing action and the elimination of gouging.

7-93. Water Wash Spray Booth Operation. Fred M. Burt. *Tool Engineer,* v. 18, March 1947, p. 29-31.

How pigment-laden air is exhausted from spray booths through water wash systems so that when the air emerges from the exhaust stacks it has all of the foreign particles scrubbed from it. Installation was used for continuous spraying of zinc-chromate primer and Navy gray synthetic enamel onto life rafts and other heavy equipment.

7-94. Superfinishing Methods and Applications. Part I. E. L. Hemingway. *Machinery,* v. 53, March 1947, p. 154-158, 174.

Details of the superfinishing process and methods of applying it to flat and cylindrical parts.

7-95. Cleaning and Plating Zinc-Base Die Castings. C. F. Nixon. *Machinery,* v. 53, March 1947, p. 180-182; *Monthly Review,* v. 34, March 1947, p. 298-309.

Polishing, buffing, cleaning, and copper-strike operation.

7-96. Metal Coating of Plastics by Vacuum Evaporation Techniques. F. C. Benner. *Electrical Manufacturing,* v. 39, March 1947, p. 107-109.

The metallizing of plastics parts in electrical products.

7-97. Plastic Coatings to Control Metal Corrosion—A Review. S. P. Wilson. *Corrosion,* v. 3, March 1947, p. 141-148.

Factors affecting corrosion and those to be considered in determining the type of coating. Advantages of various thermosetting and thermoplastic materials.

7-98. Selection and Application of Mechanical Finishes for Aluminum. Ralph E. Pettit. *Steel,* v. 120, March 17, 1947, p. 98-100, 115, 118.

Grinding, buffing, polishing, scratch brushing, ball burnishing, sandblasting and other mechanical finishing methods commonly used as surface preparation for subsequent chemical, electrochemical, or organic coatings and sometimes simply for decorative purposes.

7-99. Testing Maytag Washer Finishes. Charles W. Jensen. *Products Finishing,* v. 11, March 1947, p. 32-34, 36, 38.

How test panels are prepared and various tests to which they are subjected.

7-100. Barrel Finishing of Metal Products. Part VII. H. Leroy Beaver. *Products Finishing,* v. 11, March 1947, p. 80, 82, 84, 86, 88, 90, 92.

Research in the development of an abrasive-bond barrel-grinding procedure.

7-101. Mechanical Tumbling Cuts Cost for Parts Processing. Joseph V. Kielb. *Production Engineering & Management,* v. 19, March 1947, p. 75-80, 82.

Choice of abrasives and types of available equipment for utilizing the cost-saving advantages of tumbling for surface finishing and deburring small irregular shaped pieces.

7-102. Some Factors Influencing Tearing in Cover and Enamels. E. E. Howe and B. D. Bruce. *Better Enameling,* v. 18, March 1947, p. 6-7, 36-37.

In order to properly evaluate a change induced by any single factor, a test was devised that afforded a numerical figure for the amount of tearing produced under a given set of conditions. 4½ x 10-in. ground coated 20-gage steel sample plates were employed in all of the tests. Except where effect of weight of application was under observation, the cover enamels were applied in one coat at 45 g. per sq. ft. After spraying, the panels were dried in an electrically heated, automatically controlled, recirculating air oven.

7-103. Larger Furnaces to Speed American Stove's Enameling Program. *Ceramic Industry,* v. 48, March 1947, p. 74-75.

Conveyer system permits firing ground or cover coat in furnaces planned for individual firing. Lower drying temperature eliminates blistering of dry ground coat.

7-104. Proper Surface Preparations Assure Durable Finishes. R. E. Gwyther. *Product Engineering,* v. 18, March 1947, p. 153-155.

Methods of preparing metal surfaces prior to painting. Techniques of coating, rinsing, and cleaning for improved paint adherence and resistance to weathering. Recommended types of chemical solvents for soil and scale removal.

7-105. Sur les Phénomènes d'Adsorption et de Désorption se Produisant a la Surface du Fer Après Décapage a l'Acide ou Electrolytique. (Phenomena of Adsorption and Desorption Taking Place on the Surface of Iron After Acid or Electrolytic Etching.) Paul Bastien, Simon Mischnonsniky, and Chantal de Senneville. *Comptes Rendus,* v. 224, Jan. 13, 1947, p. 126-127.

Pickling of iron, by cathodic means or using an acid bath, causes an increase in the hydrogen content of the metal and the elimination of surface oxides. Such a surface possesses high resistance to the adsorption of air. Investigations were performed to prove this assumption and to establish the relation between the adsorption and desorption of air and hydrogen.

7-106. How to Select Coatings for Aluminum. Ray Swan and N. P. Ruther. *Steel,* v. 120, March 24, 1947, p. 78-79, 97, 100.

Suggestions apply to cast, extruded sheet as well as foil aluminum products.

7-107. The Chemical Surface Treatment of Magnesium Alloy Sheet for Spot Welding. W. F. Hess, T. B. Cameron and D. J. Ashcraft. *Welding Journal,* v. 26, March 1947, p. 170s-190s.

Before spot welding, the protective oil or chrome-pickle coating must be removed. Previously this had to be done mechanically. Various solutions were investigated in an attempt to develop a satisfactory chemical procedure. Cleanness of the sheet was evaluated by measuring sheet-to-sheet resistances. A satisfactory solution for sheet obtained from two manufacturers consisted of 10% CrO_3 containing 0.05% Na_2SO_4. 12 ref.

7-108. Polishing and Grinding Goes Modern. L. S. Sternal. *Metal Finishing,* v. 45, March 1947, p. 51-54.

Theories involved; construction and application of the various contact wheels; abrasive-belt grit sizes for given applications; future possibilities of the method.

7-109. Improved Barrel Plating Technique. Herberth E. Head. *Metal Finishing,* v. 45, March 1947, p. 55-57.

How Briggs Mfg. Co. solved problem of transferring work from barrels to baskets, and vice versa, as the work is moved from one bath to the next.

7-110. Finishing Copper by Oxidation With Sodium Chlorite. Walter R. Meyer and G. P. Vincent. *Metal Finishing,* v. 45, March 1947, p. 61-63, 71.

Oxide finishing of copper and its alloys by use of sodium chlorite and alkali. An immersion process, it not only prevents further oxidation of the surface, but acts as an excellent base for organic coatings due to the toothing of the surface caused by the oxidizing reactions. Pretreatment preparation of the metal and control conditions of the bath.

7-111. Electropolishing With Fluosulphonic Acid. (Concluded.) C. B. F. Young and Kenneth R. Hesse. *Metal Finishing,* v. 45, March 1947, p. 64-67.

Bath formulas and operating conditions for stainless and carbon steels. Life of baths; mechanism of polishing; economics of method.

7-112. Los Angeles Plating Plant Explosion. Fred A. Herr. *Metal Finishing,* v. 45, March 1947, p. 72-73, 107.

Explosion of perchloric acid, being used for electrolytic polishing of aluminum furniture, attributed to failure of the refrigeration system. Plant had been using a solution of perchloric acid and acetic anhydride.

7-113. Effect of Water Conditioning on Metal Finishing Operations. Robert S. Herwig. *Iron Age,* v. 159, March 27, 1947, p. 48-52.

An investigation to determine the effect on plating and cleaning cycles of hard water, softened water, and demineralized water. Among the advantages of using conditioned water are a reduction of drag-in, improved adhesion, elimination of sludge in hot alkaline baths, better finishes on burnished parts, easier rinsing of burnished parts, and more easily buffed deposits.

7-114. Tin as a Coating Material in the Wire Industry. Bruce W. Gonser. *Wire and Wire Products,* v. 22, March 1947, p. 207-210, 242-243.

Hot tinning; electrolytic tinning; replacement from aqueous solutions; replacement in molten salt; some unusual applications of tin coatings. 15 ref. (A paper presented before Wire Assoc. annual convention, Oct. 1946.)

7-115. Obstacle in Cleaning Drawing Compounds From Enameling Iron. W. H. Pfeiffer and V. A. Williamitis. *Journal of the American Ceramic Society,* v. 30. March 1, 1947, p. 90-94.

Under certain conditions of storage, some drawing compounds form a material on the surface of sheet enameling-iron parts which is insoluble in water and alkaline cleaners but is made soluble by organic solvents. Method of reproducing conditions necessary for the mechanism, and possible remedies.

7-116. Testing Resistance of Enameled Surfaces to Scratching, Gouging, and Abrasion. F. A. Petersen. *Journal of the American Ceramic Society,* v. 30, March 1, 1947, p. 94-104.

Seven types of cover-seat enamels were tested for resistance to scratching, gouging, and abrasion by various methods. Chemical durability and

reflectance were found to have little or no correlation with the resistance of the enamels to abrasion. Bubble structure of the layer seemed to have the greatest effect. 66 ref.

7-117. Aluminum Coated Steel. *Steel*, v. 120, March 31, 1947, p. 80-81, 102, 104.

Aluminum coated steel combines the surface characteristics of aluminum with the mechanical and physical properties of steel. Properties, finishing, and brazing.

7-118. Maintenance Metallizing. Gilbert C. Close. *Modern Machine Shop*, v. 19, April 1947, p. 136-138, 140, 142, 144, 146, 148, 150-151, 154, 156, 158, 160, 162, 164.

Latest developments in the field of metallizing. Metallurgical characteristics of sprayed metal. Four methods of surface preparation prior to metallizing. Best technique for the application of spray metal.

7-119. Metallization With Aluminum. C. R. Draper. *Light Metals*, v. 10, March 1947, p. 124-160.

An exhaustive study of all current techniques and equipment for the coating of metallic and nonmetallic bases with aluminum. Theory and practice with particular respect to the scope and economics of various fields of application. 41 ref.

7-120. Continuous Hot Galvanizing of Strip. E. A. Matteson. *Iron and Steel Engineer*, v. 24, March 1947, p. 61-62; discussion, p. 63-66.

Advantages of the continuous process over the separate-sheet process with additional information concerning the former.

7-121. Submerged Combustion in Industry. Walter George See. *Iron and Steel Engineer*, v. 24, March 1947, p. 90-94; discussion, p. 95-96.

Advantages of submerged combustion for the heating of pickling solutions. In commercial units both gas and air are forced to a burner below the surface of the liquid. When the burner is purged of liquid, the gas is automatically ignited, and the products of combustion are conducted along the bottom of the tank. There, they are vented through suitable holes, providing both agitation and heating.

7-122. Infrared Drying of Paint Materials. Raymond C. Adams. *Industrial Finishing*, v. 23, March 1947, p. 32-34, 36, 38.

Why drying setup must be properly adjusted to baking materials (and vice versa) to give results that will be economical and satisfactory, and why some infrared drying setups do not give the results that are expected.

7-123. Flock Finishing in a Custom Shop. J. Donald Bostrom. *Industrial Finishing*, v. 23, March 1947, p. 41-42, 44, 46, 48, 50, 52.

What kinds of adhesives and flock are available; their respective characteristics and merits; and the technique of applying them effectively.

7-124. The Ford Finish. E. M. Buell. *Industrial Finishing*, v. 23, March 1947, p. 60-64, 66, 68, 70.

The chief features of Ford system and setup for preparing surfaces, applying the finish, and baking the finish on Ford and Mercury automobiles.

7-125. Preweld Cleaning. W. J. Campbell. *Steel*, v. 120, April 7, 1947, p. 96, 138, 140, 142.

A few first-hand experiences on cleaning before welding. Mechanical and chemical methods generally used.

7-126. A Surface Active Agent for the Cleaning of Metals. O. M. Morgan. *Monthly Review*, v. 34, April 1947, p. 430-441.

Experimental methods and results of semi-quantitative test for evaluation of metal-cleaning compounds, using Nacconol NR.

7-127. The Electrolytic Polishing of Carbon-Manganese Steels. W. A. Sparks. *Journal of the Electrodepositors' Technical Society*, v. 21, 1946, p. 245-264. (Reprint.)

A series of experiments to obtain a process capable of being operated on a commercial scale with a minimum of technical control over the variables. Effects of various addition agents and the choice of steels.

7-128. Surface Treating Aluminum With Alodine. *Modern Metals*, v. 3, March 1947, p. 23.

Principal methods now used to protect aluminum and the advantages of Alodine over other coatings.

7-129. Preparation of Metals for Painting. R. E. Gwyther. *Corrosion and Material Protection*, v. 4, March-April 1947, p. 8, 10-11.

Cleaning methods; chemical treatments for iron and steel; preparing structural steel; zinc; aluminum; magnesium. (Presented at a Symposium on Modern Metal Protection, held jointly by the local sections of American Chemical Society, American Institute of Chemical Engineers, and The Electrochemical Society.)

7-130. A New Zinc-Base Finish for Steel Parts. J. A. Williams. *Materials & Methods*, v. 25, March 1947, p. 94-96.

Three operations required to achieve the zinc-base finish which is harder, and which provides greater protection against rusting than the previously used tin finish. First, the steel refrigerator parts are zinc plated to a thickness of from 0.0003 to 0.0005 in.

Next, the zinc plated parts are treated in Anozinc Clear to form a corrosion-resistant coating. Finally, the shelves or other steel parts are coated with a clear-baking synthetic to provide increased abrasion resistance.

7-131. Stove Polishes. Robert L. Stetson. *Soap and Sanitary Chemicals,* v. 23, March 1947, p. 133, 135, 137, 139.

Besides the well-known use for domestic cast-iron ranges, these polishes are used to protect iron and steel airplane engine parts from corrosion. Formulas for material. 16 ref.

7-132. Surface Treatments for Magnesium Alloys. (Conclusion.) Rick Mansell. *Organic Finishing,* v. 8, March 1947, p. 31-33, 36-40.

Various chemical processes, electrolytic treatments, pickling, and anodic treatment.

7-133. Metal Preparation for Porcelain Enameling With a New Type Spray-Cleaning and Pickling Machine. George Tuttle. *Finish,* v. 4, April 1947, p. 19-22, 56.

Mechanical details and processing data from equipment now in operation.

7-134. The Properties of Porcelain Enamel and Their Effect Upon Enamelware. Part II. H. D. Carter, B. W. King, and H. C. Draker. *Finish,* v. 4, April 1947, p. 23-28, 56.

The effects of various conditions and the combined effects of thickness and expansion.

7-135. Production Clinic for Finishing Die Castings. *Die Castings,* v. 5, April 1947, p. 56-57.

Chemical treatments for zinc-base die castings; cleaning magnesium die castings; difficulties that may be encountered in buffing aluminum die castings.

7-136. Sur une Méthode de Polissage Electrolytique Accélére. (A Method of Accelerated Electrolytic Polishing.) L. Chamagne, H. Granjon and A. Leroy. *Métaux & Corrosion,* v. 21, June 1946, p. 73-80.

A new method for aluminum, magnesium and similar alloys is proposed. Using a much higher voltage up to 160 volts, polishing is completed in 20 sec. The installation and the method of operation. Jacquet's perchloric acid, acetic anhydride solution was used.

7-137. Organic Finishes for Increasing the Life of Bus and Truck Parts. Roy B. Davis. *Society of Automotive Engineers Preprint,* 1947, 7 p.

The nature of the metal to be finished, the conditions of exposure, and the treatment given the metal prior to painting. Metals concerned are steel and aluminum alloys, with brief reference to zinc die castings, zinc-plated sheets, and magnesium alloys.

7-138. High-Solids Metal Lacquers. J. K. Speicher. *Canadian Chemistry and Process Industries,* v. 31, March 1947, p. 214-217.

Various methods used to increase the solids content of lacquers, thus reducing the amount of solvent required. Data are presented concerning resins which, in combination with nitrocellulose, give low viscosity solutions, and which can be used in high proportions relative to nitrocellulose and still give durable lacquers. Results of 2-year outdoor-exposure tests.

7-139. Production Control Formulas for the Tinning of Steel Sheets. J. H. Mort. *Sheet Metal Industries,* v. 24, March 1947, p. 521-530.

A series of formulas relating to production on the various types of coating machines now employed.

7-140. Some Observations on Mottled Tinplates. A. Hamelain. *Sheet Metal Industries,* v. 24, March 1947, p. 543-546, 548.

The characteristic pattern of the alloy layer and the mode of occurrence of the pattern. Experiments were made on an Aetna-type tinning machine equipped with grease-pot brushes, and an old type of machine equipped with troughs below the rollers. Reagent used for selective removal of the free-tin coating was that described by J. C. Jones in *Sheet Metal Industries,* Oct. 1931.

7-141. Infrared Drying. J. D. Keller. *Industrial Heating,* v. 14, April 1947, p. 568-570, 572, 574, 576, 578, 580, 582, 584.

Convection drying; equipment available for infrared drying; radiant gas burners; efficiency of gas burners; circulation as an aid to drying; and dryer design.

7-142. Finishing Operations at Chrysler's Dodge Division. Bryant W. Pocock. *Products Finishing,* v. 11, April 1947, p. 30-32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58.

Spraying of paint and its attendant operations. Specifications for all Dodge plating solutions.

7-143. Proper Drainage of Metal Parts. John E. Hyler. *Products Finishing,* v. 11, April 1947, p. 78, 80.

A special conveyer-type washing, rinsing, and rustproofing machine, developed for cleaning and draining cup-shaped parts.

7-144. Water Soluble Buffing Compound May Offer Advantages. *Products Finishing,* v. 11, April 1947, p. 92, 94, 96.

New type buffing compounds contain no grease, tallow, stearates, stearic acid, or paraffin wax. Specialized materials give correct amount of tackiness for easy application to the buffing wheel. Because of the ease of removal without attack on base metal,

the water-soluble buffing compounds are said to be particularly useful in finishing operations involving zinc-base die castings, aluminum, and brass.

7-145. Efficient Tooling Increases Production of Soleplates. James R. Logan. *Machine and Tool Blue Book,* v. 43, April 1947, p. 242-245.

Method of polishing and buffing soleplates.

7-146. Chemical Finishes Applied to Metals. *Machine and Tool Blue Book,* v. 43, April 1947, p. 254-256, 258-260.

Oxidizing method of preventing rust and corrosion. Recommended practices, principles, problems, and a few words of caution.

7-147. The New Dilute Cronak Process. Michael H. Bruno. *Modern Lithography,* v. 15, April 1947, p. 51, 79, 81.

How the Cronak process converts the surface on zinc electroplates to an inert substance which does not corrode. Dilute Cronak is a modification which produces a much lighter color and uses only one-tenth the amount of bichromate. Technique of the process.

7-148. Some Observations on Chipping and Scarfing Operations. Ralph D. Hindson. *Blast Furnace and Steel Plant,* v. 35, April 1947, p. 439-442.

Pickling; defects encountered, and their general causes; and chipping.

7-149. Providing a Quality Paint Finish for the Old as Well as the New. *Enamelist,* v. 24, April 1947, p. 5-9, 36.

Paint system of continuous type divided into three main units: cleaning and rustproofing, painting and baking units.

7-150. Malleable Finishing. Earl Strick. *American Foundryman,* v. 11, April 1947, p. 96-99.

Hard iron cleaning; hard iron inspection; determining grinding method; skill and equipment required; die design and construction; final inspection.

7-151. Infrared Finishing Ovens. Ira J. Barber. *Paint, Oil & Chemical Review,* v. 110, April 3, 1947, p. 8, 16, 42.

The principles and applications of the above ovens for drying and baking of finishing materials.

7-152. Preparation of Metals for Painting. A Review. R. E. Gwyther. *Corrosion,* v. 3, April 1947, p. 201-207.

How to prepare the different common metal surfaces and the results of failure to remove scale before painting.

7-153. Clean Rinsing After Metal Cleaning. L. W. Collins. *Industrial Finishing,* v. 23, April 1947, p. 35-36, 38.

Causes of poor rinsing and the final results; a typical example of the effects of poor rinsing encountered in a repair and maintenance shop of a vending-machine service company and the practical remedy suggested. Desirable features of spray rinsing.

7-154. Modern Equipment for Finishing Scales. P. E. Stonehouse. *Industrial Finishing,* v. 23, April 1947, p. 57-60.

How modern equipment adapted to the product and the work is used effectively and economically.

7-155. Rolling a Color Coat on Metal Sheets. Joseph Mihalko. *Industrial Finishing,* v. 23, April 1947, p. 63-64, 66, 68, 70.

How a uniform coat of enamel is applied to sheet metal stock by means of roller-coating machines. Metal sheets are run through and coated one side at a time.

7-156. A New Process for Electropolishing Silver. Daniel Gray and S. E. Eaton. *Iron Age,* v. 159, April 10, 1947, p. 64-65.

Process employs a current in a direction opposite from that employed in normal plating, is performed in an alkaline cyanide bath without removing the parts from the original plating racks, and results in a complete polish up to mirror brightness.

7-157. New Phosphating Tunnels Installed at Ford. Herbert Chase. *Iron Age,* v. 159, April 10, 1947, p. 82-84.

Application of phosphate coatings on an assembly-line basis in two spray tunnels. Data on the processing steps, method of handling solutions, and sludge and pumping equipment.

7-158. Silicon Monoxide for Hardening Metal Films. *Iron Age,* v. 159, April 17, 1947, p. 49.

A new technique for creating a metal surface having 100 times normal hardness with no change in reflectivity.

7-159. New Production Machine Automatically Coats Cylinder Block Cores. *Automotive and Aviation Industries,* v. 96, April 15, 1947, p. 39.

Machine automatically coats V-8 cylinder blocks and cores with a protective material. Consists of a moving conveyer, dipping tank, and spinning fixture. Sand cores, secured on the conveyer in pairs, are carried through the dipping tank containing the coating compound, and then spun to remove excess coating compound.

7-160. Phosphate Treatments. W. F. Coxon. *Metallurgia,* v. 35, March 1947, p. 233-234.

Letter criticizes several points made by E. E. Halls in his paper in December issue. Mr. Halls' reply.

7-161. Chromate Finishes to Protect Zinc Surfaces. George Black. *Materials*

& Methods, v. 25, April 1947, p. 113-116.
Three major lines of zinc after-treatments: Cronak, Iridate, and coatings known as Unichrome Dip.

7-162. Coloring of Aluminum and Its Alloys. *Materials & Methods*, v. 25, April 1947, p. 145.
Tabulation of the various colored effects which may be produced.

7-163. Metal Cleaning With the Sodium Hydride Process. H. L. Alexander. *Materials & Methods*, v. 25, April 1947, p. 156-157.
Process utilizes the reducing action of small quantities of sodium hydride, dissolved in a fused-caustic carrier bath operated at 700° F. A water quench and rinse follow. Applications.

7-164. Resurfacing Freeze Rolls by Metal Spraying Method. *Rubber Age*, v. 61, April 1947, p. 68.
Technique used in repair of a rubber-processing roll.

7-165. A New Anti-Cementation Coating. L. M. Kamionsky. *Engineers' Digest (American Edition)*, v. 4, April 1947, p 157.
A protective mixture which deposits a layer of copper on metal parts for which electroplating is not convenient or practicable. (Condensed from *Vestnik Mashinostroenia*, no. 2 and 3, 1946, p. 71-72.)

7-166. Painting and Infrared Baking of Electrical Switch Enclosures. W. H. Yeamans. *Organic Finishing*, v. 8, April 1947, p. 9, 11-13, 15-16.
A complete washing, rinsing, drying, dipping, and baking setup, installed for the purpose of simplifying painting operations, as well as increasing the flow of finished boxes to the new assembly lines.

7-167. The Kolene Process. Carl H. Lekberg. *Industrial Gas*, v. 25, April 1947, p. 11, 27-29.
Salt-bath techniques developed by Kolene Corp. for cleaning metals before coating with various materials.

7-168. Some Fundamental Aspects of the Hot Dip Galvanizing Process. W. L. Hall and L. Kenworthy. *Sheet Metal Industries*, v. 24, April 1947, p. 741-752, 758.
Hitherto unpublished work concerning methods of controlling the properties of galvanized coatings. Results of series of investigations conducted by British Non-Ferrous Metals Research over a number of years.

7-169. From Airplanes to Kitchen Ranges and Frozen Food Cabinets. Gerald Eldridge Stedman. *Finish*, v. 4, May 1947, p. 13-16, 50.
Porcelain-enameling operations at the new Consolidated Vultee plant in Nashville.

7-170. The Properties of Porcelain Enamel and Their Effect Upon Enamelware. Part III. H. D. Carter, B. W. King, and H. C. Draker. *Finish*, v. 4, May 1947, p. 17-18, 52.
Investigation shows that a close relationship exists between enamel properties and values obtained on the finished enameled ware when tested according to E.U.M.C. standards. Cover coat compositions have been confined to those containing antimony.

7-171. Anodizing of Magnesium Alloys for Protection and Appearance. George Black. *Product Engineering*, v. 18, May 1947, p. 122-124.
Electrolytic process forms protective and decorative magnesium-oxide-silicate film on alloys of magnesium. Selection of a.c. or d.c. process and the effect of film on corrosion, mechanical properties, dielectric strength, and alkalinity.

7-172. Metal Spray Reconditions Plug Valves for Longer Life. B. L. Bailie. *Power*, v. 91, May 1947, p. 80-81.
Repair process; spraying operation; machining operation; surface grinding.

7-173. Modern Tumbling Techniques Cut Finishing Costs. Herbert Chase. *Iron Age*, v. 159, May 1, 1947, p. 62-66.
The latest methods used in wet and dry tumbling for buffing, deburring, polishing and honing metal parts, and examples of savings effected at the Shakespeare Co. plant in the finishing of a variety of parts.

7-174. Metal Cleaning—Methods and Results. Jas. Rowan Ewing. *Steel*, v. 120, May 5, 1947, p. 100-101, 140, 142, 144.
Mild alkalis, liquid hydrocarbons, chlorinated solvent vapors, emulsions of hydrocarbon grease solvents and water and multiple-phase-type cleaners.

7-175. Quick Guide to Solutions for Stripping Metal Overlays. J. B. Mohler. *Iron Age*, v. 159, May 8, 1947, p. 66-67.
A quick guide to the selection of the solution most suitable for stripping a given plate from a specific base metal. Solutions are arranged in order of preference. Tables present recommended methods and makeup of solutions.

7-176. The Phosphate Treatment of Metals Prior to Painting. H. A. Holden. *Journal of the Oil & Colour Chemists' Association*, v. 30, March 1947, p. 61-70; discussion, p. 71-72.
The principles, procedures, types of process, and advantages of phosphate treatment. Work of the U.S. Bureau of Standards and of the British Standards Institution.

7-177. Vitreous Enameling of Chemical Plant. James D. Currie. *Foundry Trade Journal*, v. 81, April 17, 1947, p. 305-311;

April 24, 1947, p. 329-333; discussion, p. 333.

Materials which are mainly used by chemical manufacturers for the construction of their plants; many and varied uses to which they can be put. Enameling techniques and the testing of enameled surfaces.

7-178. Metallizing Takes Over. Edwin Laird Cady. *Scientific American*, v. 176, May 1947, p. 201-203.

Various applications.

7-179. Spraying in Electrostatic Zones. John Parina, Jr. *Steel*, v. 120, May 12, 1947, p. 106-107, 139-140, 144.

How guided spraying is cutting material costs and improving quality while doubling and tripling production in finishing departments of diverse industries.

7-180. Aluminum Finishes. Frank Taylor. *Metallurgia*, v. 35, April 1947, p. 297.

Discussion of paper, "Aluminum Developments," by S. A. J. Sage in the February issue.

7-181. Surface Hardening of Aluminum and Its Alloys. Frank Taylor. *Metallurgia*, v. 35, April 1947, p. 298.

Discussion of paper of same title by Robinson and Mott in February issue.

7-182. Surface Preparation and Film Thickness. Henry L. Bottemiller. *Paint, Oil & Chemical Review*, v. 110, May 15, 1947, p. 14-15, 36-37, 40.

Results of a Navy paint-testing program in which application techniques, as well as different paints, were evaluated. Results indicate that the poor service given by most ship paint jobs during the war was caused by improper application techniques and lack of a sufficient number of coats. Four coats are superior to two.

7-183. Plastic Coating Expedites Stainless Stamping Operations. W. A. Phair. *Iron Age*, v. 159, May 15, 1947, p. 47-51.

Use of strippable plastic coating on stainless steel sheets gives promise of permitting substantial reductions in finishing costs in stamping, particularly deep-drawing operations, by eliminating die marks and other marring of the surface. Reports from several stamping plants using this material.

7-184. Degreasing and Rust-Inhibiting With Infrared. *Iron Age*, v. 159, May 15, 1947, p. 51.

Employment of an infrared burn-off oven designed for treating sheet-metal products prior to painting. Process burns off grease and similar film and simultaneously produces a blue surface described as a tight scale which protects hidden surfaces not ordinarily reached by rust resistant liquids.

7-185. Infrared Finishing Ovens. Ira J. Barber. *American Paint Journal*, v. 31, May 19, 1947, p. 58, 60, 63-64, 66-67.

The economics of paint baking.

7-186. Electropolishing—What Is Its Status Today? Charles L. Faust. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions)*, 1946, p. 49-73; discussion, p. 73-74.

History of its development including a table which shows the patent coverage of the various processes. The limitations and advantages of the process. Recommended solutions and procedures for electropolishing stainless steel, carbon and alloy steels, nickel, copper, brass, monel and nickel silver, aluminum, and cadmium. Possible application to other metals, costs, and metallographic applications.

7-187. Examination of Electrocleaned Steel by Electron Diffraction Technique. C. W. Smith and I. L. Karle. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions)*, 1946, p. 117-127; discussion, p. 127-128.

Electron micrographs illustrate the results of an investigation of the chemical composition of steel surfaces cleaned under controlled conditions. A particular point of interest was to determine whether compounds of iron were formed by combination with common cleaning materials such as caustic soda, sodium metasilicate, and trisodium phosphate. If compounds were found to be present, it was also determined whether they were removed by an acid dip prior to the plating cycle.

7-188. The Effect of Surface Preparation on the Durability of Organic Coatings. V. M. Darsey. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions)*, 1946, p. 130-140; discussion, p. 140-141.

Methods of metal preparation prior to painting and methods for determining surface cleanness. The effects of different methods of surface preparation on corrosion of steel and on paint retention determined by outdoor-exposure tests. Superiority of phosphate coating techniques. 15 ref.

7-189. Coating, Strippable, Spray Type. E. H. Bucy. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions)*, 1946, p. 141-144; discussion, p. 144.

Spray-packaging type of coating developed for the Navy for storage of military equipment. Application methods.

7-190. Resins of the Vinyl Family in Metal Finishing. F. L. Scott. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Session)*, 1946, p. 152-162; discussion, p. 171-172.

Properties of polyvinyl esters, and vinyl and vinylidene chloride polymers and copolymers. General requirements of resins used in contact with plating solutions, and in maintenance of coatings and product finishes.

7-191. Stripping of Copper From Various Base Metals. F. C. Mathers. *Proceedings of the American Electroplaters' Society, (33rd Annual Technical Sessions),* 1946, p. 177-181.
Advantages and limitations of the various present and proposed methods.

7-192. Manodyzing and Dye Coloring Magnesium Alloys. Paul R. Cutter. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions),* 1946, p. 257-284; discussion, p. 284-285.
A new electrolytic method which forms a protective and decorative magnesium oxide and silicate film on the surface of magnesium alloys. The application of the coatings, preparation and control of solutions, use of organic finishes over the Manodyz coating, and application of dye coloring.

7-193. Practical Facts About Polishing and Buffing Compounds. Howard J. McAleer. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions),* 1946, p. 285-292.
Different types of buffing compounds and their applications.

7-194. Parkerizing: Growth or Shrinkage? N. A. Tope. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions),* 1946, p. 293-304.
Experiences in the application of phosphate coatings to ⅜ in. high-tensile steel studs on a production basis. Difficulties were experienced in maintaining the extremely close thread dimensional limits required. When the operation was first set up, there was little either of decrease or increase in dimensions, but later there were many cases of growth by as much as 0.004 in. in effective diameter, and of an excessively crystalline deposit. Investigation of various factors resulted in elimination of most of the difficulty.

7-195. The Electrolytic Polishing of Metals in Research and Industry. R. W. K. Honeycombe and D. S. Kemsley. *Commonwealth of Australia, Council for Scientific and Industrial Research, Melbourne, Serial No. 150,* March 5, 1947, 29 p.
The theory of electrolytic polishing and a survey of methods used in the laboratory and in industry. 62 ref.

7-196. Production Processes. Their Influence on Design. Part XXIII. Roger W. Bolz. *Machine Design,* v. 19, May 1947, p. 131-139.
Barrel finishing of machined parts requires less time and results in superior finish.

7-197. Three Scuff-Resistant Coatings for Ferrous Wearing Surfaces. *SAE Journal,* v. 55, May 1947, p. 42-43.
Some specific applications of manganese iron phosphate coating, iron oxide coating, and caustic-sulphur coating. (Based on paper "Scuff and Wear Resistant Chemical Coatings," by F. C. Young and B. B. Davis.)

7-198. Barrel Finishing of Metal Products. Part IX. H. Leroy Beaver. *Products Finishing,* v. 11, May 1947, p. 46-48, 50, 52, 54, 56.
The relationships of barrel finishing and polishing in general production.

7-199. Finishing Clinic. Allen G. Gray. *Products Finishing,* v. 11, May 1947, p. 58-59, 62, 64, 66, 68, 70, 74, 76, 78.
Factors to be considered in cleaning of aluminum; selection and application of clear metal lacquers; continuous spray cleaning and pickling for porcelain enameling and infrared baking; latex-dip coatings; determination of thickness of tin coatings on copper and brass.

7-200. Cleaning and Finishing Vacuum Cleaner Parts. Sanford Markey. *Products Finishing,* v. 11, May 1947, p. 80, 82, 84, 86.
A unique washing technique plus infrared drying used by the P. A. Geier Co., Cleveland.

7-201. Production Finishing Equipment Featured in Experimental Laboratory. *Products Finishing,* v. 11, May 1947, p. 92, 94, 96, 98.
Testing laboratory operated by Newcomb Detroit Co. Policy is to provide facilities for interested manufacturers to conduct their own tests.

7-202. New Anticorrosive Finish Gives 20 Years' Protection. *Iron Age,* v. 159, May 22, 1947, p. 76, 152.
New coating developed to protect ferrous metal surfaces from atmospheric corrosion is claimed to afford protection to metals exposed to severe weathering conditions, for a period of 20 years or more without further application. It can be applied cold by brushing, spraying, or dipping; sets up in a short time and can be pigmented, painted, or plated.

7-203. The Electrolytic Polishing of Metals. Part I. Electrolytic Polishing of Copper in Orthophosphoric Acid. *Council for Scientific and Industrial Research, Physical Metallurgy Report No. 9,* Sept. 9, 1946, 7 p.
Results of a study of the mechanism of the above electropolishing process.

7-204. Finishing Steel for Decorative and Protective Purposes. Reid L. Kenyon. *American Iron and Steel Institute Preprint,* 1947, 28 p.
Developments in nonmetallic finishes, electroplated and hot-dip metallic coatings, combined metallic and nonmetallic coatings, porcelain enamels, stainless steel, and special finishes.

7-205. The Metallizing of Glass and Plastics by the Reduction of Aqueous Solutions. Patrick B. Upton. *Journal of the Electrodepositors' Technical Society Reprint,* v. 22, 1947, p. 45-72.

The more important of the older processes, together with new modifications, and attempts to collate the new methods or techniques now being employed or developed. Preparation of the surface to be metallized; silvering processes and their application; use of metals other than silver; use of the metal film as a basis for electrodeposition.

7-206. Coats Make the Product. Charles A. Breskin. *Scientific American,* v. 176, June 1947, p. 256-258.

Application of plastic coatings to metals, paper, and leather.

7-207. Scottish Firm Installs Plant for Cast Iron Porcelain Enameling. *Enamelist,* v. 24, May 1947, p. 29-31.

Plant and equipment.

7-208. Infrared Sheds New Light on Low-Cost Drying. *Modern Industry,* v. 13, May 15, 1947, p. 81-82, 84, 86.

Examples of its diversified use.

7-209. Electropolishing Silver to Reduce Finishing Costs. Daniel Gray and S. E. Eaton. *Metal Finishing,* v. 45, May 1947, p. 60-61, 65.

Production-line methods using alkaline-cyanide baths now in use for finishing of silver by Oneida, Ltd.

7-210. Application of Metallic Coatings. Rick Mansell. *Metal Finishing,* v. 45, May 1947, p. 62-65.

A survey of corrosion, cleaning and pickling, polishing methods, and electrodeposition processes for metallic coatings. (To be concluded.)

7-211. Electrostatic Spraying of Porcelain Enamel. Richard E. Helmuth. *Steel Processing,* v. 33, May 1947, p. 281-284.

The techniques used, and the advantages of the method over conventional processes.

7-212. Exhaust Unit for Fume Suppression. *Iron Age,* v. 159, May 29, 1947, p. 63.

An exhaust unit for suppressing obnoxious gases from lead baths, pickling tanks, galvanizing tanks, plating tanks, nitriding furnaces and spray-cleaning booths in which cleaning solvent is used.

7-213. Plastic Film Cuts Spray Booth Stripping Costs. *Iron Age,* v. 159, May 29, 1947, p. 69.

Time cut from 2 hr. to 5 to 10 min. Coating is applied to clean walls with standard spray guns to a thickness of 0.002 to 0.005 in. No greasing or other preparation is required. To remove the coating, a corner is broken with a putty knife and the accumulations are peeled off in large chunks.

7-214. Protective Coatings Under Test. *Chemical Engineering,* v. 54, May 1947, p. 154-155.

Cooperative test program of Sherwin-Williams and Dow Chemical Co. being conducted at the latter's Freeport, Texas, plant. Test panels are exposed to air laden with both marine salts and miscellaneous chemical fumes.

7-215. Materials for Wire-Wound Resistors—Some Recent Developments. Edward E. Marbaker. *Materials & Methods,* v. 25, May 1947, p. 83-88.

Silicone coatings found to be most satisfactory for resistance units which had to withstand diverse and destructive heat and atmospheric conditions. Form consists of a ceramic or other insulating core wound with resistance wire, the ends of which are attached to band and tab or ferrule terminals.

7-216. Chemically Generated Film Aids in Corrosion Control. *Steel,* v. 120, June 2, 1947, p. 101-102, 144.

Latest developments in a method that converts the surface of zinc or cadmium into a complex chromate.

7-217. Developments in the Application of Gas Infrared Heating to Metal Finishing. J. B. Carne. *Sheet Metal Industries,* v. 24, May 1947, p. 989-992, 998.

Equipment available; heat needed; types of finishes to which it may be adapted.

7-218. Vitreous Enameling Spraying Technique in Enamel Application. A. J. Biddulph. *Sheet Metal Industries,* v. 24, May 1947, p. 1005-1008, 1013.

Equipment: types of gun; containers for enamel; spray booths; exhaust and dust extractions; method of spraying; recent developments. (A paper presented at meeting of the Institute of Vitreous Enamellers.)

7-219. Modern Wire Pickling Practice and Plant Design. Part I. Edward Mulcahy. *Wire Industry,* v. 14, May 1947, p. 269-271.

British practice. (To be continued.)

7-220. Specialized Enamel Plant Production—Bathtubs and Sinks. Harry B. Richardson. *Finish,* v. 4, June 1947, p. 15-17.

Operations at Newark Enameling Corp., Bloomfield, N. J. Production process takes only 2 hr.

7-221. Lithium Compounds in Porcelain Enamel Compositions. Part I. Paul A. Huppert. *Finish,* v. 4, June 1947, p. 18-21, 60.

Past work on the subject of lithium in enamels, and results of an investigation into the merits of certain new types of ground-coat enamels using lithium manganite and lithium cobaltite.

7-222. Enamel Division Program Report—American Chemical Society Forty-

Ninth Annual Meeting. *Finish,* v. 4, June 1947, p. 29-31, 34-35, 38-39, 41, 52-56, 62.

Authors' resumes of the following papers: The mechanism of fracture in porcelain enamels, by Paul L. Smith. The effect of chemical preoxidation of steel in promoting the adherence of cover-coat enamels, by H. S. Saunders. Suppression of radiations at high temperatures by means of ceramic coatings, by D. G. Bennett. Effect of firing treatment of ground coats on quality of dry process enamels for cast iron, by R. R. Danielson and J. H. Koenig. Determination of compression present in porcelain enamel on sheet iron, by E. E. Bryant and M. G. Ammon. Measurement of enamel slip consistency by means of the Brookfield viscosimeter, by E. M. Oliver. The determination and effect of sulphur gases in plant atmospheres, by B. J. Sweo and M. J. Bozsin. The effect of variations in color stains on the colors produced in porcelain enamels, by Ralph L. Cook and Robert W. Pelz. Refractory ceramic base coats for metal, by W. J. Plankenhorn. The effect of composition on the properties of titanium enamels, by A. L. Friedberg, F. A. Petersen, and A. I. Andrews.

7-223. The Use of Metallic Pigments in the Preparation of Protective Paints. J. E. O. Mayne. *Journal of the Society of Chemical Industry,* v. 66, March 1947, p. 93-95.

Satisfactory metallic pigments for coating of steel must contain metals less noble than iron and the particles must be in metallic contact with each other and also with the steel. Of the group studied—aluminum powder, zinc dust, and magnesium powder—only zinc dust is said to fulfill the latter condition.

7-224. The Attack of Molten Zinc on Steel in Hot Dip Galvanizing. Heinz Bablik. *Metal Treatment,* v. 14, Spring 1947, p. 29-35.

Structure of the coatings formed in relation to the pre-existing structure of the basis steel. Certain analogies are found between the attack by molten zinc and by sulphuric acid. Surface decarburization is believed to be important in determining the structure of the coatings.

7-225. Factors to Consider in Galvanizing With Gas. A. D. Wilcox. *Industrial Gas,* v. 25, May 1947, p. 15-17, 26-30.

An illustrated discussion.

7-226. Production Metallizing Solves the Problem of Protecting the Welded Seam in Steel Barrels and Drums. *Industrial Gas,* v. 25, May 1947, p. 21.

A production setup designed to apply economically a coating of electrolytic zinc to the area adjacent to the longitudinal welded seam.

7-227. Spraying Color on Parts of Plated Ornaments. George Hilfinger. *Industrial Finishing,* v. 23, May 1947, p. 47-50, 52.

How precision masks are used to guide sprayed colors into certain depressed areas of chromium plated ornaments.

7-228. Conveyerized Cleaning, Spraying and Infrared Drying Layout. Fred M. Burt. *Industrial Finishing,* v. 23, May 1947, p. 54-56, 58, 60.

Layout of equipment for cleaning, spray-painting, and drying metal parts for space heaters.

7-229. Better Spray Painting of Metal Products. C. Raymond Syer. *Industrial Finishing,* v. 23, May 1947, p. 63, 66, 68, 70, 72, 74, 79, 81.

Recommended techniques.

7-230. Protective and Decorative Finishes for Cast Aluminum. John J. Stobie, Jr. *Modern Metals,* v. 3, May 1947, p. 14-19.

Mechanical, chemical, organic and electrolytic finishes. 27 ref.

7-231. Scale Removal and Surface Preparation With Sodium Hydride. H. L. Alexander. *Iron and Steel Engineer,* v. 24, May 1947, p. 44-51; discussion, p. 51.

Historical background; status in industry; chemistry in the bath; testing; treating cycle; equipment; raw materials; placing unit in operation; operating precautions; applications.

7-232. Flame Spraying of Metals and Plastics. *Paint Manufacture,* v. 17, May 1947, p. 154-156.

Recent developments using the powder process.

7-233. Electrical Properties of Paint Films on Metals. F. Wormwell and D. M. Brasher. *Nature,* v. 159, May 17, 1947, p. 678-679.

Results obtained for several paint systems show that there is a characteristic fall in potential during the first few hours. After an intervening period of somewhat fluctuating potential, there is a rise to a maximum with a final decline. An investigation of apparent ohmic resistance and the apparent capacity of the paint film showed that capacity changes are roughly parallel to the approximate area covered with rust.

7-234. Insulated Infrared in the Finishing Industry. William J. Miskella. *Organic Finishing,* v. 8, May 1947, p. 9, 11, 13-15, 17, 38.

Use of insulation and proper lamp spacing for reduced costs and better products.

7-235. Navy Bureau of Aeronautics Colloquium on Protective Coatings. George W. Grupp. *Organic Finishing,* v. 8, May 1947, p. 19-23, 32.

Reviews papers presented.

7-236. Dyeing Anodized Aluminum. J. P. Gill. *Metal Industry,* v. 70, May 9, 1947, p. 340-341.

Method used and selection of dyestuffs. 13 ref. (Concluded.)

7-237. Metal Spraying. *Metal Industry,* v. 70, May 9, 1947, p. 345.

Use of a sprayed-zinc undercoat on lacquered metal furniture prevented cracking caused by flexing of the chairs during use.

7-238. Aluminum Glamourized by Color. Phil Glanzer. *Tool Engineer,* v. 18, June 1947, p. 39-40.

New finishing techniques.

7-239. Preparation of Automotive Parts for Painting by Phosphate-Spray Coating. *Industrial Heating,* v. 14, June 1947, p. 981-982, 984.

Materials-handling system of Parker-Wolverine Div., Udylite Corp., Detroit, used in connection with bonderizing of auto-body parts.

7-240. Burdett Incorporates Rust-Proofing Treatment Into Its Burn-Off Process. *Industrial Heating,* v. 14, June 1947, p. 986, 988.

New Burdett burn-off rustproofing process consists primarily of the proper placing of gas-fired infrared burners in relation to the work. This process is claimed to not only remove grease and similar film, but simultaneously produce a blue surface on the metal that is extremely rust resistant.

7-241. Stripping Finishing Materials. George Conrad. *Organic Finishing,* v. 8, June 1947, p. 9, 11-13.

Various methods.

7-242. Electrostatic Spraying Methods. *Organic Finishing,* v. 8, June 1947, p. 15, 17-19.

A general discussion.

7-243. Corrosion Retarding of Aluminum Alloys. Rick Mansell. *Organic Finishing,* v. 8, June 1947, p. 21, 23-25, 27-29.

Survey of the selection of organic coatings for the above. (Concluded.)

7-244. Plastic Resins as Protective Coatings. Paul O. Blackmore. *Organic Finishing,* v. 8, June 1947, p. 30-33, 36, 38.

Alkyds; urea and melamine; acrylics; polystyrene; vinyls; vinylidene chloride; and silicones. (Concluded.)

7-245. New Types of Silver Coatings. Peter P. Hopf. *Electronic Engineering,* v. 19, June 1947, p. 193-194, 198.

An improved silvering preparation and an improved technique for applying printed circuits to nonmetallic materials, especially ceramics. The material is a stabilized colloid of metallic silver containing a minimum amount of silver oxide. The usual silk-screen printing method is replaced by an offset-printing technique. An alternate method especially useful for application to plastics consists of fusing the silver to the plastic by high-frequency heating.

7-246. The Use of Porcelain Enamel to Resist Corrosion. J. E. Hansen. *Enamelist,* v. 24, June 1947, p. 4-11, 54.

Properties and applications.

7-247. Progress of Westinghouse and Industry Development to Reduce Chippage and Losses on Porcelain Enameled Ranges. R. F. Bisbee. *Enamelist,* v. 24, June 1947, p. 12-25, 60.

Improvements in manufacturing and shipping procedures.

7-248. Magnetic Holding Method for Silk-Screen Processing. W. A. Barrows and E. H. Brandenburg. *Enamelist,* v. 24, June 1947, p. 34-35, 54.

Process in which electromagnets are used to hold enameled-steel sheets during silk-screen processing.

7-249. Barrel Finishing of Metal Products. Part X. Factors in the Evaluation of Steel Burnishing Materials. H. Leroy Beaver. *Products Finishing,* v. 2, June 1947, p. 74-76, 78, 82, 84.

Relative efficiencies of various sizes and mixtures of sizes of balls.

7-250. Electrolytic Polishing of Magnesium. George Black. *Metal Finishing,* v. 45, June 1947, p. 86-87, 94.

Methods for anodic polishing of magnesium alloys as described in British patents.

7-251. Applications of Metallic Coatings. Rick Mansell. *Metal Finishing,* v. 45, June 1947, p. 91-94.

Cleaning, finishing, mechanical coating, and electrodeposition processes. (Concluded.)

7-252. Infrared Finishing Ovens. Ira J. Barber. *Paint and Varnish Production Manager,* v. 27, June 1947, p. 147-148, 150, 152, 167.

Paints and ovens for infrared baking, time-temperature combinations, costs.

7-253. Degreasing. *Metal Industry,* v. 70, June 6, 1947, p. 425.

Use of a synthetic wetting agent made by Shell Petroleum, Ltd.

7-254. Man-Sized Improvements at Modest Cost. *Modern Industry,* v. 13, June 15, 1947, p. 81-82, 87.

Improved pickling setup at Republic Steel Corp.'s Massillon, Ohio, plant.

7-255. Reflector Finishing Process. Ralph Pettit. *Steel,* v. 120, June 23, 1947, p. 114, 117.

Use of "Alzak" electrolytic process in which the surface is first electropolished, then anodized to produce a transparent, protective coating of aluminum oxide.

7-256. Modern Wire Pickling Practice and Plant Design. Part II. Copper Rod Pickling. Edward Mulcahy. *Wire Industry,* v. 14, June 1947, p. 321-322, 330.

Procedures for the pickling of cop-

per rod and wire, and also for recovery of copper by the electrolytic and copper sulphate crystallization processes. (To be continued.)

7-257. **Finishing and Inspection.** D. F. Sawtelle. *American Foundryman,* v. 11, June 1947, p. 44-46.
Procedures followed in mechanized malleable foundry of Malleable Iron Fitting Co., Branford, Conn.

7-258. **Floyd-Wells Modernization Program Nearing Completion.** *Better Enameling,* v. 18, June 1947, p. 9-10.
Equipment and procedures of stove manufacturing, especially pickling and enameling phases.

7-259. **Manufacturing Economies Result From Barrel Finishing.** Herbert Chase. *Materials & Methods,* v. 25, June 1947, p. 84-88.
Use of barrel finishing to deburr, burnish, hone, and perform other finishing operations on large as well as small parts made of a wide variety of metals.

7-260. **Cleaning of Metals.** C. A. Snavely. *Metals Review,* v. 20, June 1947, p. 5-6.
New developments in evaluation of cleaners, acid pickling, cleaning with molten salts and blast cleaning, reported in the literature for the past year.

7-261. **Metal Finishing.** E. L. Combs. *Metals Review,* v. 20, June 1947, p. 6-7.
New developments in polishing and buffing, metal coloring, anodizing, metal spraying, and hot dipping reported in the literature for the past year.

7-262. **Equipment for the Finishing Department.** *Metals Review,* v. 20, June 1947, p. 9-15, 17-18, 20, 22, 24, 26, 28, 30.
149 new products and processes for metal cleaning, rustproofing, coating, and plating reported during 1946. List of manufacturers and their addresses.

7-263. **Vitreous Enamel. Its Preparation and Application.** D. S. O'Donnell. *Canadian Chemistry and Process Industries,* v. 31, June 1947, p. 527-529, 535.
Operations at the enamel plant of Frigidaire Products of Canada, Ltd., Leaside, Ont.

7-264. **Aluminum as a Reflector.** *Light Metals,* v. 10, June 1947, p. 297-303.
Observations on front-surfaced mirrors; the reflection of infrared radiation and reflectivity of aluminum paint. (Concluded.)

7-265. **Alodizing Aluminum.** Norman P. Gentieu. *Industrial Finishing,* v. 23, June 1947, p. 34-36, 40, 42, 44, 46.
Chemical surface treatment for aluminum. Recommended methods for preparing the surface for the treatment; for applying it; and for cleaning, rinsing, and drying after application.

7-266. **How Buick Finishes Hoods, Fenders and Wheels.** Larry Strong and H. F. Reves. *Industrial Finishing,* v. 23, June 1947, p. 49-50, 52, 54, 56.
Techniques described and illustrated.

7-267. **Roller Coating Endless Metal Strips.** I. Basso. *Industrial Finishing,* v. 23, June 1947, p. 59, 61, 62, 64, 66.
Color is rolled on two sides and two edges of metal strips for venetian-blind slats. The operation is continuous and automatic.

7-268. **Preheating Products Before Painting.** Gilbert C. Close. *Industrial Finishing,* v. 23, June 1947, p. 68, 70.
Products are heated before being painted instead of afterward to speed drying of coatings.

7-269. **Tin Coating Meehanite.** *Iron Age,* v. 159, June 26, 1947, p. 57.
Results obtainable with each of two successful procedures—fused-chloride and fused-nitrate dipping.

7-270. **Organic Finishes for Magnesium Alloys.** Allen G. Gray. *Steel,* v. 120, June 30, 1947, p. 73-74, 101.
Various finishing materials, their specific uses, and methods of applying. (Concluded.)

7-271. **Flame-Priming Overcomes Moisture.** *Linde Tips,* v. 26, July 1947, p. 83-84.
How corroded dam gates of hydro-electric plant were restored by flame-priming.

7-272. **Electrostatic Finishing Doubles Spray-Coat Production.** W. B. Stephenson. *Production Engineering & Management,* v. 20, July 1947, p. 75-76.
Average savings of 50% on paint material and considerably greater savings on labor result from use of new method by Delta Electric Products Co.

7-273. **Cast Iron Chill Roll Stainless Clad in 24 Hours.** David Jenkins. *Metco News,* v. 4, July 1947, p. 2-3.
How cast-iron roll is given the same corrosion resistant characteristics as solid stainless.

7-274. **Cutting Maintenance Costs. Major Repairs Within Scheduled Shutdowns.** Daniel L. Cannie. *Metco News,* v. 4, July 1947, p. 4-5.
Repair of worn or corroded journals and bearing shafts by metallizing at Continental Paper Company's paperboard plant at Ridgefield Park, N. J.

7-275. **Short Cuts in Shaft Work.** *Metco News,* v. 4, July 1947, p. 11-12.
Improved setup for spray metallizing.

7-276. **Sealing Lead Coatings by Shot-blasting.** *Metco News,* v. 4, July 1947, p. 14-15.

Investigation which showed that a light undercoat of Metcoloy No. 1 or 2, or of Sprasteel No. 10, would permit shotblasting of sprayed lead coatings, without destroying the bond.

7-277. Production Clinic for Finishing Die Castings. *Die Castings,* v. 5, July 1947, p. 51-52.

Methods used in selection and application of organic finishes for magnesium die castings.

7-278. Electro-Erosion—a New Tool for Metal Working. Robert Magidoff. *Welding Engineer,* v. 32, July 1947, p. 64, 66, 68.

New process invented by Soviet technicians for drilling, slotting, cutting, grinding or, by reverse action, electroplating. A spark discharge (not an arc) is produced, which erodes away the surface.

7-279. Electrostatic Forces Aid Paint Spray Techniques. *Electronic Industries & Electronic Instrumentation,* July 1947, p. 6-7.

Descriptive.

7-280. Limestone Used to Neutralize Acid Wastes. A. R. Reidl. *Chemical Engineering,* v. 54, July 1947, p. 100-101.

Unique system of upflow limestone beds and aeration used by General Electric's Philadelphia Works for neutralizing the effluent from acid dipping and plating operations. Need for expensive acid pumps is thus eliminated. Experimental data regarding the proper size of the beds and the optimum rate of flow of the acid.

7-281. Preparing Steel for Porcelain Enameling. G. H. McIntyre. *Steel,* v. 121, July 21, 1947, p. 102, 112, 115, 118, 120.

Importance of good nickel flash in lowering rejects and insuring generally good enameling qualities of all types of steel. Proper nickel deposit improves bonding range of ground coat and minimizes copper beading and fish-scaling by reducing overactive oxidation characteristics of steel.

7-282. Electrolytic Polishing of Magnesium. George Black. *Metal Finishing,* v. 45, July 1947, p. 84-86.

Results of some experiments on adaptation to production processes of Jacquet's method for electrolytic polishing prior to metallographic examination.

7-283. Contributo alla Conoscenza dei Processi di Lucidatura Elettrolitica dei Metalli. (Contribution to the Study of Electropolishing Processes.) R. Piontelli, D. Porta, and L. Arduini. *La Metallurgia Italiana,* Jan-Feb. 1947, p. 3-11.

A new experimental installation for the study of electropolishing processes permitting a convenient reproduction of the anodic tension curve as a function of time and current density. The mechanism of the process, with specific reference to the influence of both composition and conditions of electrolysis. (Reprint.)

7-284. Sur l'Examen par Diffraction Electronique des Surfaces Obtenues par Polissage Electrolytique. (Examination of Electropolished Surfaces by Means of Electron Diffraction.) J. Trillat. *Comptes Rendus,* v. 224, April 14, 1947, p. 1102-1103.

Examination of surfaces polished electrolytically in a perchloric-acetic bath showed that Beilby's film, which is always present on the surfaces of mechanically polished specimens, disappears after electropolishing.

7-285. Finishing Chrysler and DeSoto Passenger Car Bodies. Bryant W. Pocock. *Products Finishing,* v. 11, July 1947, p. 24-26, 28, 30, 32, 34, 36, 38, 40.

7-286. Finishing Clinic. Allen G. Gray. *Products Finishing,* v. 11, July 1947, p. 50, 52, 54, 56, 58, 60, 62, 64, 66, 70-71.

Tests for evaluation of industrial finishes; passivating treatments for cadmium plate; temperature control of alkaline cleaning baths; reducing hydrogen embrittlement in electroplating; use of masking tape in finishing operations; proper racking in plating of aluminum.

7-287. Barrel Finishing of Metal Products. Part II. Barrel Finishing as an Intermediate Operation. H. Leroy Beaver. *Products Finishing,* v. 11, July 1947, p. 74, 76, 78, 80, 82, 84, 86.

7-288. Abrasive Blast Treatment Speeds Parts Cleaning. Arthur P. Schulze. *Tool Engineer,* v. 18, July 1947, p. 35-38.

How airless mechanical cleaning effects faster machining and improved quality.

7-289. The Self Opacification of Titanium Enamels. W. H. F. Tickle. *Sheet Metal Industries,* v. 24, July 1947, p. 1409-1413, 1419.

The theory of nuclei and opacification, and the effect of ferric oxide and other isomorphous compounds on titanium enamels. 11 ref.

7-290. The Possibilities and Limitations of Electrolytic Polishing. A. F. Brockington. *Sheet Metal Industries,* v. 24, July 1947, p. 1414-1416.

A survey of the present status of the art.

7-291. The Protection of Ships' Bottoms and the Formulation of Anticorrosive Compositions. F. Fancutt and J. C. Hudson. *Journal of the Oil & Colour Chemists' Association,* v. 30, May 1947, p. 135-158; discussion, p. 158-162.

Organization of the Marine Corrosion Sub-Committee and a survey of its researches. Procedures used and

results obtained in development of improved anticorrosive compositions. Use of paints containing aluminum and other metallic pigments is tentatively recommended. 11 ref.

7-292. **Teinte Grise ou Noire des Pellicules d'Oxydation Anodique sur Alliages Al-Mg Industriels. (The Gray or Black Color in Anodic Oxidation Films on Industrial Al-Mg Alloys.)** J. Herenguel and R. Segond. *Métaux et Corrosion,* v. 21, Aug-Sept. 1946, p. 101-104.

The gray color of the anodic oxidation films in industrial aluminum is caused by the silicon content of the metal. This defect differs from spotting which Lacombe defined, although it appears similar.

7-293. **Report of Committee D-12 on Soaps and Other Detergents.** *American Society for Testing Materials Preprint 71,* 1947, 9 p.

Proposed tentative specifications for sodium bicarbonate and for borax, and proposed tentative method for total-immersion corrosion testing of water-soluble aluminum cleaners.

7-294. **Mechanical Properties of Chromium Diffusion Coatings.** N. S. Gorbunov, I. D. Yudin, and N. A. Izgaryshev. *Comptes Rendus de l'Academie des Sciences de l'U.R.S.S.,* v. 55, no. 5, 1947, p 415-417. (In English.)

Some results obtained in studying the microhardness of chromium diffusion coatings on metals with different carbon contents. The layers of chromium were produced on the surface of steel and cast-iron specimens in a chlorine atmosphere. The diffusion coatings did not differ appreciably in hardness from the bulk material.

7-295. **Parkerizing as an Aid to Lubrication.** *Engineering Materials,* v. 5, June 1947, p. 46-51.

Use of this phosphating treatment.

7-296. **Spray Finishing of Metalware** M. C. Lumle. *Industrial Finishing,* v. 23, July 1947, p. 27-30, 32.

How a high-grade finish is applied in one coat to a wide variety of sizes and shapes of metalware.

7-297. **Gold and Metal Leaf Applied to Fine Frames.** P. C. Bardin. *Industrial Finishing,* v. 23, July 1947, p. 36-38, 40, 42.

How foundation materials are mixed; how surfaces are prepared; methods of laying gold and metal leaf; and use of specialty finishes on metal-leafed frames.

7-298. **Decals Applied in Mass Production.** C. F. Newburg. *Industrial Finishing,* v. 23, July 1947, p. 54, 57-58, 60, 62.

Methods of handling and applying decals to difficult and simple surfaces, all on a mass production basis.

7-299. **An Alkali-Resistance Test for Porcelain Enamels.** E. Skillicorn and J. E. Hansen. *Enamelist,* v. 24, July 1947, p. 16-20.

Application of simple laboratory test.

7-300. **Porcelain Enameling at Western Stove Company.** F. M. Burt. *Enamelist,* v. 24, July 1947, p. 21-27, 64.

Layout, procedures, and equipment.

7-301. **Water Immersion Testing of Metal Protective Paints; Role of Electro-endosmosis in Water Absorption and Blistering.** W. W. Kittelberger and A. C. Elm. *Industrial and Engineering Chemistry,* v. 39, July 1947. p. 876-881.

Over 90% of the total water absorbed by a linseed-oil-type paint coating, under the influence of both a concentration and a potential gradient, was transferred into the film by electro-endosmotic forces. The greater resistance to water absorption and blistering of some paint coatings may be not so much due to a greater inherent waterproofness as to an appreciably higher electrolytic resistance.

7-302. **Protecting Surface Finish With Strippable Plastic Coatings.** H. R. Clauser. *Materials & Methods,* v. 26, July 1947, p. 70-74.

Properties and applications of the three general types: solvent strip coatings; water-dispersion coatings; and hot-melt coatings.

7-303. **Types and Characteristics of Modern Porcelain Enamels.** Harold A. Knight. *Materials & Methods,* v. 26, July 1947, p. 93-98.

Preparation of the metal surface; the nickel-flash treatment; new enamel compositions; enameling aluminum; titanium steel for enameling; high-temperature ceramic coatings; and miscellaneous new applications.

7-304. **No Electric Current Used in New Method of Plating Nickel and Cobalt on Metal Surface.** *Steel,* v. 121, July 28, 1947, p. 84, 86, 88, 100, 102.

New coating process, called electroless plating—reported at recent American Electroplaters' convention. It is brought about by chemical reduction of a nickel or cobalt salt with hypophosphite in hot solution. Latest methods of bath purification.

7-305. **Inrichting Van Spuitcabines En Spuitkasten Voor Het Bewerken Van Voorwerpen Door Middel Van Een Zandstraal. (Installation of Suction Boxes and Compartments for Sandblast Cleaning.)** H. T. Hart. *Metalen,* June 1947, p 175-180.

Directions for construction of equipment used for blast cleaning of castings and steel structures.

7-306. **Full Automatic Hot Zinc Galvanizing of Tanks.** Raymond F. Led-

ford. *Iron Age,* v. 160, July 31, 1947, p. 56-60.
Advantages of conveyerized tank-galvanizing installations; makeup and other characteristics of baths for mechanized operations.

7-307. Test Shot-Blasting for Sealing Sprayed Lead Coatings. *Iron Age,* v. 160, July 31, 1947, p. 60.
Tests indicate shot-blasting will eliminate porosity of the coatings. A sprayed undercoat of one of three metals is also necessary.

7-308. Scales Finished Electrostatically. D. A. Hilliard. *Organic Finishing,* v. 8, July 1947, p. 19-21.
Methods used by Landers, Frary & Clark, New Britain, Conn.

7-309. Preparing Steel for Painting. Ivor Richards. *Organic Finishing,* v. 8, July 1947, p. 29-30.
A brief outline.

7-310. Brilliant Silver Spray. A. S. Langlotz. *Organic Finishing,* v. 8, July 1947, p. 31-33.
Procedures for applying to non-conductive services of different types.

7-311. Cleaning and Heat Treating Aluminum Alloys. W. J. Rogers, F. Carl, R. Seabury, and N. Smith. *Modern Metals,* v 3, July 1947, p. 24-26.
An S.A.E. publication. Previously abstracted.

7-312. Copper-Titanium Alloy Coatings on Mild Steel. Edward J. Chapin and Carle R. Hayward. *Transactions of American Society for Metals,* v. 38, 1947, p 909-956.
Coating of mild steel with copper-titanium alloys of several compositions by the application of heat in a protective atmosphere. Compositions ranging from 5 to 37.5% were investigated. The most satisfactory coating was of approximately eutectic composition of about 25% Ti content. Observations on metallographic examination, microhardness determinations, bend, corrosion, diffusion, and nitriding. 12 ref.

7-313. Approach to Proper Method of Preparing Steel Sheets for Vitreous Enameling. D. J. Benoliel and W. J. Haring. *American Ceramic Society Bulletin,* v. 26, July 15, 1947, p. 213-214.
Development of balanced cleaner compositions; ionic aspects of surfaces; sources of surface contamination; mechanics of cleaning surfaces; prerequisites of a satisfactory cleaner.

7-314. Electrolytic Polishing; Application to Stainless Steel and Nickel Silver Cutlery. (Concluded.) H. Evans and E. H. Lloyd. *Metal Industry,* v. 71, July 18, 1947, p. 51-52.
Tests of surface finish; defects.

7-315. Briggs Adopts Special Lacquer-Drying Ovens. Joseph Geschelin. *Automotive Industries,* v. 97, Aug. 1, 1947, p. 32-33, 62.
Use of direct-fired recirculating air units for all drying operations at Detroit plant recently converted from airplane parts manufacture to automobile body assembly.

7-316. Modern Wire Pickling Practice and Plant Design. Part III. Construction of Pickling Tanks: Acid Storage. Edward Mulcahy. *Wire Industry,* v. 14, July 1947, p. 377-380.
Diagrams of acid tanks, lime tanks, rinse tanks, storage tanks, continuous systems. (To be continued.)

7-317. Principles and Applications of Metal Spraying. Howard Batsford. *Machine and Tool Blue Book,* v. 43, Aug. 1947, p. 168-170, 172-174, 176-178.
A few case histories of metal spraying applications and basic principles.

7-318. Treatments for Metal Surfaces Prior to Painting. E. F. Hickson and W. C. Porter. *Product Engineering,* v. 18, Aug. 1947, p. 128-130.
Equipment for spray chamber process and directions for treatment of steel; galvanized metal and sheet zinc; aluminum and aluminum alloys; lead; copper and brass; and magnesium alloys.

7-319. Effect of Composition, Heat Treatment, and Cold Work on the Hydrogen Embrittlement of Stainless Steel Wire During Cathodic Pickling. Carl A. Zapffe and O. George Specht, Jr. *Transactions of American Society for Metals,* v. 39, 1947, p. 193-211; discussion, p. 212.
A new test for exploring the nature of hydrogen embrittlement and the factors controlling it. Relative susceptibilities of different types of steel under conditions of equal concentration of surface hydrogen; effect of heat treatment; effect of cold work; and general progress of embrittlement with increasing charging time. 11 ref.

7-320. Acid Composition, Concentration, Temperature, and Pickling Time as Factors in the Hydrogen Embrittlement of Mild Steel and Stainless Steel Wire. Carl A. Zapffe and M. Eleanor Haslem. *Transactions of American Society for Metals,* v. 39, 1947, p. 213-237; discussion, p 237-240.
Explores by means of the constant-rate, single-bend test, the variables that affect the hydrogen embrittlement in steel, in straight acid pickling without addition of inhibitors. Variables investigated were: composition, thermal treatment, and mechanical treatment of the steel; composition, concentration, and temperature of the acid; and pickling time. Six different

acids were studied. Relationships of the seven variables.

7-321. A New Southern Stove Plant for Straightline Production. Gerald Eldridge Stedman. *Finish,* v. 4, Aug. 1947, p. 15-18, 50.
Equipment, procedures, and layout of Florence Stove Co.'s enameling plant, Lewisburg, Tenn.

7-322. Chemical Reaction in Metal Protective Paints. E. J. Dunn, Jr. *Corrosion,* v. 3, Aug. 1947, p. 374-382.
The phenomenon of metallic soap formation by reaction of the pigment with the vehicle. Different soap structures. Soap contents and acid numbers of paints and dried paint were determined for a series of pigments. Permeability of raw linseed oil films after adding various lead soaps.

7-323. Electrolytic Polishing; Theory and Practice. Joseph Mazia. *Monthly Review,* v. 34, Aug. 1947, p. 937-944.
A review. 31 ref.

7-324. M.B.V. Process; Application of a Corrosion-Resistant Aluminum Oxide Coating. R. P. Marshall. *Metal Industry,* v. 71, Aug. 1, 1947, p. 93.
Modified Bauer-Vogel process, developed by G. Eckert in 1930, produces an aluminum oxide coating on aluminum and its alloys which, although not so hard as an anodized coating, is very resistant to corrosion. New plant and alloys treated.

7-325. Wet Grinding Sheet and Strip. T. E. Lloyd. *Iron Age,* v. 160, Aug. 14, 1947, p. 65-66.
A new finishing machine which will simultaneously wet grind both sides of cut or coiled sheet or strip. This unit will grind, polish or buff carbon and stainless steel, clad metal, magnesium, aluminum, or plastics.

7-326. Finishing Is Not a Bottleneck. *Die Castings,* v. 5, Aug. 1947, p. 60-61.
Polishing, finishing, and spray painting of aluminum alloy and steel vacuum cleaner parts.

7-327. Production Clinic for Finishing Die Castings. *Die Castings,* v. 5, Aug. 1947, p. 51-53.
Application of organic finishes to zinc-base die castings, and bright dips for copper and copper alloys.

7-328. Aluminum Electropolishing Plant. Fred A. Herr. *Metal Finishing,* v. 45, Aug. 1947, p. 63-64.
The new half million dollar plant of Automatic Polishers operated in Los Angeles.

7-329. Conditioning Hot Dip Galvanizing Baths. Wallace G. Imhoff. *Steel,* v. 121, Aug. 18, 1947, p. 108, 125, 127.
Hot dip galvanizing of small articles such as nails. Factors considered are the correct revolution per minute, the proper basket load, mechanical conditions, bath temperature and metal condition.

7-330. The Enameling Industry. R. R. Danielson. *Ceramic Age,* v. 50, July 1947, p 41-45.
Developments over past 25 years.

7-331. Finishing Clinic. Allen G. Gray. *Products Finishing,* v. 11, Aug, 1947, p. 50, 52, 54, 56, 58, 60, 62, 66, 68, 70, 72.
Importance of chromium plating under conditions of optimum throwing power; chemical treatment for improvement of corrosion resistance of zinc electroplates; recent developments in silicone resin finishes; phosphate treatments for final assembly; electropolishing of silver; highlighted finish for aluminum articles.

7-332. Electrostatic Finishing Process Doubles Production at Delta Electric. W. B. Stephenson. *Products Finishing,* v. 11, Aug. 1947, p. 40, 42, 44, 46.
Application to miscellaneous articles at Delta Electric Co., Marion, Ind.

7-333. Barrel Finishing of Metal Products. Part XII. Factors in the Barrel Finishing of Light Specific Gravity Parts. H. Leroy Beaver. *Products Finishing,* v. 11, Aug. 1947, p. 28-30, 32, 34, 36, 38.
Suggests using same techniques as for barrel finishing plastics and vegetable ivory, bone and pearl shell items.

7-334. A Protective Filming Process for Tinplate. H. R. Clauser. *Materials & Methods,* v. 26, Aug. 1947, p. 97-100.
The Protectatin process is a simple method of coating tinplate and can be applied to the plate before forming.

7-335. Electropolishing Silver-Plated Parts in Cyanide Solutions. Daniel Gray and S. E. Eaton. *Materials & Methods,* v. 26, Aug. 1947, p. 78-81.
Technique of the process and some advantages.

7-336. Titanium-Bearing White Enamels in Shop Practice. Paul A. Huppert. *Ceramic Industry,* v. 49, Aug. 1947, p. 64-65.
Procedures, advantages and disadvantages, and possible sources of trouble.

7-337. There's More to Good Finishes Than Meets the Eye. *Electrical Manufacturing,* v. 40, Aug. 1947, p. 89-91, 214, 216, 218, 220.
The importance of proper pretreatment of metallic surfaces before applying paints or other finishes. (Limited to phosphate-type compounds.)

7-338. The Alumilite Process. R. H. Petit. *Modern Metals,* v. 3, Aug. 1947, p. 16-18.

Aluminum coatings—particularly those offering protection against corrosion. Process offers a wide variety of colors in addition to a good paint base and a protective coating. Smudging or staining is also prevented.

7-339. The Self-Opacification of Titanium Enamels; an Account of Some Recent Investigations. W. H. F. Tickle. *Sheet Metal Industries,* v. 24, Aug. 1947, p. 1627-1632.

Yellowing of second coat applications; the physical form of titanium dioxide used; effect of adding ferric oxide to the mill; improvement of color index; the theory of iron-oxide effect; X-ray powder diagrams of titanium frits. (Concluded.)

7-340. Liquid Honing; Further Developments in Vapor Blast. C. A. Prince. *Machinery Lloyd (Overseas Edition),* v. 19, Aug. 2, 1947, p. 68-69.

Liquid honing is a surface cleaning deburring and finishing method based on the use of a fine abrasive mixed with a chemical emulsion discharged by compressed air against the surface to be treated. Industrial applications.

7-341. Offset Machines Produce Wood Grain on Steel. Herbert Chase. *Iron Age,* v. 160, Aug. 21, 1947, p. 80-84.

Procedure and equipment used at Fisher Body. Considerable savings result from the substitution of this finish for the decals previously used.

7-342. Porcelain Coats on Metal Bases. Edward Mackasek. *Scientific American,* v. 177, Sept. 1947, p. 106-109.

Development of thinner, more resistant coatings which will impove countless products for both home and industry.

7-343. The Nature of Enamel Adherence. R. M. King. *Mining Magazine,* v. 77, Aug. 1947, p. 37-39, 56.

General theory of adherence; glass-to-metal seals; "oxide" theory; "dendrite" theory; the ferrous phase; etched surface theory; and adherence and coefficient of expansion.

7-344. Spray-On Zinc Coating Methods. Ivor Richards. *Organic Finishing,* v. 8, Aug. 1947, p. 30-33, 36-38.

Wire and powder metallizing. Hot dipping compared with zinc spraying.

7-345. Plastic Coatings to Control Metal Corrosion. S. P. Wilson. *Organic Finishing,* v. 8, Aug. 1947, p. 39-42.

Thermosetting and thermoplastic materials and uses and selection for various purposes. (To be continued.)

7-346. Obstacles in Cleaning Drawing Compounds From Enameling Iron. W. H. Pfeiffer and V. A. Williamitis. *Enamelist,* v. 24, Aug. 1947, p. 18-24.

Under certain conditions of storage, some drawing compounds (die lubricants) form or deposit a material on the surface of sheet enameling-iron parts which is insoluble in water and alkaline cleaners but is made soluble by organic solvents. Remedies offered. Test method should aid in the development of improved drawing compounds and more effective cleaning methods.

7-347. Modern Wire Pickling Practice and Plant Design. Part IV. Acid Recovery Systems. Edward Mulcahy. *Wire Industry,* v. 14, Aug. 1947, p. 441-442.

Methods of recovery of acid with advantages and economics of each.

7-348. Continuous Galvanizing. A. D. Stout, Jr. *Iron Age,* v. 160, Aug. 28, 1947, p 79-80.

A continuous pipe galvanizing process, capable of coating up to 600 tons of 2-in. pipe every 24 hr., is said to produce zinc-coated tubular products having smoothness, luster and uniformity of coat superior to that produced by earlier batch-type galvanizing methods.

7-349. Spra-Bonderizing. *Automobile Engineer,* v. 37, Aug. 1947, p. 313-314.

Production line for continuous application of this coating to body parts in British automobile factory.

7-350. Discussion of Paper on Outdoor Exposure of Filled Asphalt Coatings. Milton R. Beasley. *ASTM Bulletin,* Aug. 1947, p. 88.

Effects of filling on asphalt coatings for metal shown photographically. Author's reply by G. L. Oliensis.

7-351. Measurement of Metal Polish Performance. Frank E. Clarke and Robert C. Adams. *ASTM Bulletin,* Aug. 1947, p. 57-62.

Equipment and procedures for evaluating the performance characteristics of polishes used for brightening decorative metal work. Development of a polishing machine, a tarnishing procedure, and a polishing procedure. Tests for abrasion, caking, flammability, poisonous constituents, and reaction; tests for evaluation of silver polishes.

7-352. Metal Protection by Metal Powder. *Machinery Lloyd (Overseas Edition),* v. 19, Aug. 16, 1947, p. 99-100.

Schori powder spraying process.

7-353. Vehicle Paint Job Success Keyed to Surface Treatment. *SAE Journal,* v. 55, Sept. 1947, p. 57-58.

Photographs of exposure panels show effects of several different types of treatment. (Digest of "Metal Treatments Prior to Painting", by Van M. Darsey.)

7-354. **How to Select Coatings for Aluminum.** Ray Swan and N. P. Ruther. *Canadian Metals & Metallurgical Industries,* v. 10, Aug. 1947, p. 23, 40-41.

Recommendations for various types of base material and for different applications.

7-355. **Metal Sprayed With Molten Porcelain Enamel.** Duncan C. Pell. *Ceramic Industry,* v. 49, Sept. 1947, p. 65, 67.

New type of air-pressure blowgun, used by the Army and Navy to coat water tanks, which finishes metal surfaces with molten glass, metals, or plastics.

7-356. **Tin Saving in the Turbine Works of a Cast Iron Foundry.** V. I. Smirnov. *Boiler and Turbine Manufacture (U.S.S.R.),* April 1947, p. 27-28. (In Russian.)

Wartime experiments on the practicability of various metals as substitutes for tin in the coating of cast iron. Good results were obtained by dip coating with zinc and also by application of aluminum paint.

7-357. **Hot Dip Galvanizing; Analytical Methods for Routine Control.** F. F. Pollak and E. F. Pellowe. *Metal Industry,* v. 71, Aug. 22, 1947, p. 143-145.

The adaptation of existing methods of analysis for rapid routine control.

7-358. **De-Enameling Process.** *Stove Builder,* v. 12, Sept. 1947, p. 48-49.

A commercial de-enameling process and layout.

7-359. **Chemical Finishing of Metals.** F. P. Heard. *Monthly Review,* v. 34, Sept. 1947, p. 1035-1042.

Chemical finishing means the conversion of the surface layer of a metal article from its metallic state to a chemical compound of that metal by chemical means. Oxide coatings on ferrous metals; other processes for steel; black oxide coatings on copper alloys; phosphate coatings on ferrous and nonferrous metals.

7-360. **Survey of the Cleaning Methods Used for Iron and Steel Surfaces.** Rick Mansell. *American Paint Journal,* v. 31, Sept. 1, 1947, p. 54, 56, 60.

Solvent cleaners, steam cleaning, phosphoric acid cleaners, vapor degreasing, alkaline cleaners, and electrolytic cleaners.

7-361. **Synthetic Finishing Operations at Philco.** Herbert Chase. *Products Finishing,* v. 11, Sept. 1947, p. 24-26, 28, 30.

Procedures and equipment used in finishing of radio parts.

7-362. **Racks for Finished Parts.** John E. Hyler. *Products Finishing,* v. 11, Sept. 1947, p. 34, 36.

Design of racks used in supporting various shapes and sizes of metal parts that have been freshly sprayed or dipped.

7-363. **Barrel Finishing of Metal Products. Part 13—Barrel Finishing Procedure and Its Relation to Porosity of Electrodeposited Surfaces.** H. Leroy Beaver. *Products Finishing,* v. 11, Sept. 1947, p. 38, 40, 42, 44, 46, 48, 50.

A general discussion.

7-364. **Electroless Plating on Metals by Chemical Reduction.** *Products Finishing,* v. 11, Sept. 1947, p. 54-56, 58.

Method developed by the National Bureau of Standards.

7-365. **Fishtails—an Old Buffing Problem.** T. R. Treadwell. *Metal Finishing,* v. 45, Sept. 1947, p. 68-70.

Definition and causes for this buffing fault; a series of corrective measures.

7-366. **Factors to Consider in Hot Dip Galvanizing.** A. D. Wilcox. *Industrial Heating,* v. 14, Sept. 1947, p. 1426-1428, 1430, 1458.

The process, with special reference to the use of gas as fuel for firing kettles. (Based on paper presented before Midwest Industrial Gas Council.)

7-367. **Enameling Iron Developments and Their Effect on Enamel Shop Processes.** *Better Enameling,* v. 18, Sept. 1947, p. 6-7, 37

A report of the Process Development Committee, Porcelain Enamel Institute.

7-368. **From an Ancient Art to a Modern Industry. Part II.** Paul A. Huppert. *Better Enameling,* v. 18, Sept. 1947, p. 22.

Review of the enameling industry (concluded). 39 ref.

7-369. **Boston Stove Installs Own Porcelain Enameling Department.** *Better Enameling,* v. 18, Sept. 1947, p. 26-31.

Equipment, procedures, and layout

7-370. **Protection by Cocooning.** *Aircraft Production,* v. 9, Sept. 1947, p. 329.

Application of anticorrosion storage coatings by spray gun.

7-371. **Factors Used to Determine Galvanizing Pot Length, Width, Depth, and Side Thickness.** Wallace G. Imhoff. *Industrial Gas,* v. 26, Sept. 1947, p. 10-11, 29-32, 34.

Facts and figures accumulated over many years of practical experience from actual pots in service

7-372. **Om Lacktorkning med Värmestralar. (Concerning Drying of Lacquer by Radiant Heat.)** Olow Wennerholm. *Finish (Sweden),* v. 4, July 1947, p. 150.

Use of infrared lamps by Ford and others in drying paint and lacquer finishes.

7-373. Efficient Metal Cleaning Practice. E. L. McIlhenny. *Enamelist,* v. 24, Sept. 1947, p. 12-15, 52.

Need for versatility brought about by new equipment trends.

7-374. Pacific Coast's Newest Porcelain Enameling Plant. Fred M. Burt. *Enamelist,* v. 24, Sept. 1947, p. 16-22.

Layout, equipment, and procedures at new plant of California Metal Enameling Co., Los Angeles.

7-375. Protection of Iron and Steel by Metallic Coatings. J. C. Hudson and T. A. Banfield. *Iron and Steel Institute Advance Copy,* Dec. 1946, 36 p.

Observations on the behavior of a wide range of protective coatings applied to mild steel exposed to field corrosion tests as part of the investigations of the Protective Coatings Sub-Committee. These results cover periods of up to five years in the case of atmospheric exposure and of two years in that of immersion in sea-water. The coatings investigated were aluminum, cadmium, lead, tin, and zinc, also 82-18 cadmium-zinc alloy and 88-12 lead-tin alloy. They were applied in one or more of three standard thicknesses by a wide variety of processes, including cementation, electrodeposition, hot-dipping, and spraying with the molten-metal pistol, the powder pistol, and the wire pistol. 18 ref.

7-376. Cleaning, Painting and Drying Setup for Power Scooters. Gilbert C. Close. *Industrial Finishing,* v. 23, Sept 1947, p. 34-36, 41.

Conveyerizing; infrared tunnels; efficiency, speed and flexibility of system.

7-377. Production Painting of New Motor Coaches. Walter Rudolph. *Industrial Finishing,* v. 23, Sept. 1947, p 42-45, 46, 48, 50, 52.

How attractive coatings are produced on conveyerized setup. Effective metal cleaning methods. Masking operations and spot priming.

7-378. Cleaning Metal for Painting. F. L. Kinrab. *Industrial Finishing,* v. 23, Sept. 1947, p. 55-56.

Fitting cleaning preparations and methods to type of adherents and size and shape of piece.

7-379. Finishing Metal Caskets. F. M. Hagan. *Industrial Finishing,* v. 23, Sept 1947, p. 75-76, 78.

Technique for producing high-luster finish.

7-380. Some Spraying Setups You Want to Avoid. W. C. Anderson. *Industrial Finishing,* v. 23, Sept. 1947, p. 93-94, 96.

Some very bad conditions found to exist in and around spray booths.

7-381. Aircraft Finishing and Related Problems. S. H. Phillips. *Organic Finishing,* v. 8, Sept. 1947, p. 18-26.

Various steps involved, including preliminary cleaning and surface treatments.

7-382. Finishing Office Equipment. Frank V. Faulhaber. *Organic Finishing,* v. 8, Sept. 1947, p. 31-33, 36-41.

Finishing metal office equipment.

7-383. Plastic Coatings to Control Metal Corrosion. S. P. Wilson. *Organic Finishing,* v. 8, Sept. 1947, p. 42-45.

Properties and applications of the various types.

7-384. Corrosion and Cost. *Iron and Steel,* v. 20, Sept. 1947, p. 436.

Methods for protection of mild-steel structures against rust. Value of sprayed coatings.

7-385. Adhesion Testing of Organic Coatings. *Materials & Methods,* v. 26, Sept. 1947, p. 115.

Twenty different test methods.

7-386. Anticorrosive Protection. *Machinery Lloyd (Overseas Edition),* v. 19, Sept. 13, 1947, p. 74-78.

Cleaning and finishing procedures; bituminous and plastic coatings; and the role of pigments and fillers in coating compositions.

7-387. Metal Spraying. J. Porter. *Automobile Engineer,* v. 37, Sept. 1947, p. 343-346.

Use of the above for reclamation of worn or faulty parts.

7-388. Chemical Removal of Scale, Sludges and Oxides From Steel Plant Equipment. B. H. McDaniel. *Iron and Steel Engineer,* v. 24, Sept. 1947, p. 43-49; discussion, p. 49-50.

7-389. Injury in Ground Surfaces. L. P. Tarasov. *Canadian Metals & Metallurgical Industries,* v. 10, Sept. 1947, p. 19-21.

Factors which determine the crack sensitivity of steel to the grinding process.

7-390. Lengthening the Service Life of Induced Draft Fans. A. F. Tagin. *Engineers' Digest (American Edition),* v. 4, Sept. 1947, p. 443.

Method consists in coating the fan blades and the internal casing surfaces with a layer of water-glass. Service results are claimed to be excellent. (Translated and abstracted from *Promishlennaya Energetika (U.S.S.R.),* v. 4, no. 2, 1947, p. 12-13.)

7-391. Plating Molybdenum, Tungsten, and Chromium by Thermal Decomposition of Their Carbonyls. J. J. Lander and L. H. Germer. *Metals Technology,* v. 14, Sept. 1947, T.P. 2259, 42 p.

Plating of molybdenum and tung-

sten, and of compounds and alloys of these metals, by pyrolysis of their carbonyl vapors. Chromium has also been plated in this manner, but the results have been much less satisfactory. The apparatus, procedures, and properties of the products. Plating of magnetron rings for test purposes, and the design of a machine for conducting this operation on a commercial basis. 15 ref.

7-392. **A Typical Jobbing Plant for Cast Iron and Sheet Metal Enameling.** Dana Chase. *Finish,* v. 4, Oct. 1947, p. 19-21.
Enamels everything from die casters' bowls to store fronts.

7-393. **The Development of Modern Covercoat Enamels.** G. H. Spencer-Strong. *Finish,* v. 4, Oct. 1947, p. 22-23.
Reflectance, amount of material used, and cost for a 25-year period.

7-394. **Ninth Annual Forum Program Report.** *Finish,* v. 4, Oct. 1947, p. 27-29, 32, 58.
Papers from Porcelain Enamel Institute Forum. How to choose the correct type of porcelain enamel for specific applications, résumé by J. E. Hansen. Apparatus for evaluation of adherences, editor's report by A. C. Francisco. Continuous cleaning and pickling of parts for porcelain enamel with cable-type pressure spray machine (excerpts), by George N. Tuttle. Conventional pickle practice, by A. M. Langbein.

7-395. **Barrel Finishing of Metal Products. Part 14. The Phenomena Termed "Ball Pattern".** H. Leroy Beaver. *Products Finishing,* v. 12, Oct. 1947, p. 36, 38, 40, 42, 44, 46, 48, 50.
The author believes that ball pattern as a defect is largely a figment of the imagination, or caused by improper loading techniques. This thesis is expounded at some length.

7-396. **Chrysler Corporation's Paint Methods Department.** Bryant W. Pocock. *Products Finishing,* v. 12, Oct. 1947, p. 54, 56, 58, 60, 62, 64, 66, 68.
System of paint research and paint control.

7-397. **Finishing Clinic.** Allen G. Gray. *Products Finishing,* v. 12, Oct. 1947, p. 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96.
Factors in the selection of protective coatings; use of limestone beds to neutralize waste from acid dipping and pickling operations; activated carbon purification of plating solutions; metal distribution factors; surface active agents for alkaline cleaning and acid etching; aluminum surface preparation for organic finishing.

7-398. **Metal Cleaning—Methods and Results.** Jas. Rowan Ewing. *Metal Finishing,* v. 45, Oct. 1947, p. 82-84.
Reprinted from *Steel,* May 5, 1947 (see item 7-174).

7-399. **Principles of Immersion and Humidity Testing of Metal Protective Paints.** A. C. Elm. *Corrosion,* v. 4, Oct. 1947, p. 501-509; discussion, p. 509-538.
Reprinted from *ASTM Bulletin,* v. 142, Oct. 1946, p. 9-27.

7-400. **Modern Paint Removers.** L. E. Kuentzel and A. W. Liger. *Iron Age,* v. 160, Oct. 9, 1947, p. 78-83.
Air Force specifications, some basic considerations concerning the performance of various types of strippers and a number of helpful suggestions for expediting the removal of paint films. 16 ref.

7-401. **Electrochemical Surface Treatment of Iron Screening for Use in Reinforced Glass.** V. P. Mashovets and A. P. Obukhov. *Journal of Applied Chemistry (U.S.S.R.),* v. 20, no. 3, 1947, p. 219-224. (In Russian.)
Details of a commercial process which has been worked out for electrochemical degreasing, cleaning, and degasification.

7-402. **Passivation Des Aciers Inoxydables. (Passivation of Stainless Steels.)** L Guitton *Métaux et Corrosion,* v. 22, April 1947, p. 47-60.
The first two chapters of a 4-chapter article covering the activity and passivity of stainless steel. A general study is made of passivation conditions with respect to stainless steel. Results of application of findings to cold and hot worked specimens.

7-403. **Painting Exterior Steel Surfaces.** Rick Mansell. *Corrosion and Material Protection,* v. 4, Sept-Oct. 1947, p. 8-10, 12.
Surface preparation; spray and brush application; application of primer; formulation of the paints; properties of the pigments used; accelerated exposure tests; rust; and types of metal primers and top coats.

7-404. **Tin Undercoating Improves Rust Resistance of Steel.** *Iron Age,* v. 160, Oct. 23, 1947, p. 45.
Use of a 0.00005-in. thick coating on mild steel before painting is recommended. (From report of Tin Research Institute.)

7-405. **Beneficiation of Over-Spray Porcelain Enamel.** Donald W. Scott, L. A. Roe, and B. J. Sweo. *Mining Technology,* v. 11, Sept. 1947, T.P. 2253, 12 p.
Application of ore-dressing methods to the recovery of nearly pure frit or glass from over-spray, or waste, porcelain enamels. Clay, organic dye and dirt can be removed to yield a beneficiated enamel acceptable for interior one-coat finishes in regular plant

practice. Flow sheet, involving screening, flotation, and magnetic separation.

7-406. Anodizing of Aluminum. *Light Metal Age,* v. 5, Oct. 1947, p. 22-24.

A brief survey of some of the more general factors involved.

7-407. A Comparison of Pickling Acids. *Wire Industry,* v. 14, Oct. 1947, p. 558.

Compares hydrochloric and sulphuric acids.

7-408. Conventional Pickle Practice. A. M. Langbein. *Better Enameling,* v. 18, Oct. 1947, p. 6-7, 22-23, 26-30.

Operations of a manually-operated pickling room giving cost data. (Presented at Porcelain Enamel Institute Forum, Columbus, Ohio, Sept. 11, 1947.)

7-409. Chemical Treatments for Zinc Surfaces—a Review. H. A. Holden. *Sheet Metal Industries,* v. 24, Oct. 1947, p. 1975-1983.

67 references. (Presented at Third International Conference on Electrodeposition organized by the Electrodepositors' Technical Society.)

7-410. The Principles and Scientific Applications of the Electrolytic Polishing of Metals. P. A. Jacquet. *Sheet Metal Industries,* v. 24, Oct. 1947, p. 2015-2025, 2030.

Metallography; study of surface properties; study of oxidation and corrosion; X-ray and electron diffraction; suppression of cold emission of metallic surfaces in high vacuum; study of thin deposits and single crystals. 161 ref. (Presented at the 3rd International Conference on Electrodeposition organized by the Electrodepositors' Technical Society.)

7-411. New Bonderizing Process for Aluminum and Steel. Harold A. Knight. *Materials & Methods,* v. 26, Oct. 1947, p. 99-101.

Problems encountered in using sheet steel and sheet aluminum on the same production line are lessened by a phosphate treatment which works equally well on both materials with identical treatments.

7-412. Ties Life of Parts to Painting Method. *SAE Journal,* v. 55, Oct. 1947, p. 60.

Recommended surface cleaning and painting methods for bus and truck parts. Based on "Organic Finishes for Increasing the Life of Bus and Truck Parts", by Roy B. Davis. (Presented at S.A.E. Transportation Meeting, Chicago, April 16, 1947.)

7-413. Preparing Steel for Porcelain Enameling. G. H. McIntyre. *Stove Builder,* v. 12, Oct. 1947, p. 39-45, 105-111.

Steel differences; nickel flash; variables to be controlled; recommended sequence for nickel flash.

7-414. Metallic Pigment Progress (Gold Bronze, Aluminum Powder). Henry H. Mandle. *Organic Finishing,* v. 8, Oct. 1947, p. 12-13, 15-17, 19-21, 23.

Nontechnical article deals with the progress and development of bronze powders for use with lacquers and other organic finishes. 18 ref.

7-415. Protecting Magnesium Alloys. Rick Mansell. *Organic Finishing,* v. 8, Oct. 1947, p. 24-30.

Adhesion difficulties with organic coatings; alkaline-peeling theory; galvanic corrosion; chemical and electrochemical coatings; surface pretreatments; primers; finishes; test methods and results.

7-416. Finishing Elevator Car Interiors. *Organic Finishing,* v. 8, Oct. 1947, p. 41-43.

Procedures.

7-417. Protective Coatings. *Organic Finishing,* v. 8, Oct. 1947, p. 47-48, 68.

Organic finishes; metal coatings; galvanizing.

7-418. Painting and Enameling Domestic Units at "Hotpoint" Appliance Plant. *Industrial Heating,* v. 14, Oct. 1947, p. 1700-1702, 1704, 1706, 1708.

Procedures and equipment. (To be continued.)

7-419. Protective Wire Coating Production Accelerated. Charles W. Ange. *Industrial Gas,* v. 26, Oct. 1947, p. 13-14.

Application of lead-alloy coating known as Okoloy to copper conductors.

7-420. Scuff and Wear Resistant Chemical Coatings. F. C. Young and B. B. Davis. *SAE Quarterly Transactions,* v. 1, Oct. 1947, p. 626-629, 661.

Results of an investigation of three types of surface treatment for cast iron and steel which give superior wear and scuff resistance. These are: immersion in a bath of 50% NaOH containing 1% sulphur; formation of an iron oxide coating of the desired type ($FeO + Fe_3O_4$) by a furnace procedure; and immersion in a manganese phosphate bath. (Presented at S.A.E. Annual Meeting, Detroit, Jan. 6, 1947.)

7-421. A Four-Story Millroom is Interesting Feature at Consolidated-Vultee Aircraft Corp. *Enamelist,* v. 24, Oct. 1947, p. 14-17.

Layout, equipment, and procedures for porcelain enameling.

7-422. Continuous Cleaning and Pickling of Parts for Porcelain Enamel With Cable-Type Pressure Spray Machine. George N. Tuttle. *Enamelist,* v. 24, Oct. 1947, p. 4-7, 58-59.

Design and operation of above ma-

chine. (Presented at 9th Annual Porcelain Enamel Institute Forum, Columbus, Ohio, Sept. 10-12, 1947.)

7-423. Practical Facts About Polishing and Buffing Compounds. Part I. Howard J. McAleer. *Die Castings,* v. 5, Oct. 1947, p. 62-64.

What is accomplished by buffing and polishing; types of compounds used; abrasives and binders; methods of spray gun application. (To be continued.)

7-424. Suppression of Radiations at High Temperatures by Means of Ceramic Coatings. D. G. Bennett. *Journal of the American Ceramic Society,* v. 30, Oct. 1, 1947, p. 297-305.

Development of a method for measuring the emissivities of ceramic-coating materials with respect to oxidized stainless steel. The emissivities were studied from 800 to 1600° F., and were found to cover a range from more than 100% to less than 10%. Lepidolite was the highest emitter, Uverite the lowest. High-temperature ceramic paints were found to be effective radiation suppressors and thermal insulators. (Presented at 49th Annual Meeting, American Ceramic Society, Atlantic City, N. J., April 23, 1947.)

7-425. A Study of Dry-Process Cast-Iron Ground-Coat Enamels. R. R. Danielson and J. H. Koenig. *Journal of the American Ceramic Society,* v. 30, Oct. 1, 1947, p. 306-311.

Results of a study of variation in firing treatment of ground coats for cast iron and resulting effects on the quality of adherence and the tendency to blister of dry-process enamels. Impact resistance of enameled specimens. Plans for further studies. (Presented at 49th Annual Meeting, American Ceramic Society, Atlantic City, April 24, 1947.)

7-426. Finishes for Insides and Outsides of Metal Containers. J. H. McKenzie. *Industrial Finishing,* v. 23, Oct. 1947, p. 36-38, 40, 42.

Methods of applying durable coatings; tests.

7-427. Finishing Otis Elevator Cabs. *Industrial Finishing,* v. 23, Oct. 1947, p. 46-48.

7-428. Production Painting and Baking of Automobile Parts. M. J. Fehlen. *Industrial Finishing,* v. 23, Oct. 1947, p. 54-56, 58, 60.

How new automobile parts are spray painted and baked on a fast production basis in a minimum area.

7-429. Spray Painting Automobile Moldings. Glenn Ferdon. *Industrial Finishing,* v. 23, Oct. 1947, p. 62-64, 66.

New conveyerized, automatic, electrostatic spray-painting setup.

7-430. Roller Coating Venetian Blind Slats. William F. Trilk. *Industrial Finishing,* v. 23, Oct. 1947, p. 72-74, 76.

How a portable roller coater finishes 2 sides and 2 edges of Venetian blind slats, rails, and fascia boards.

7-431. Coating Products With Flock. Arthur P. Schulze. *Industrial Finishing,* v. 23, Oct. 1947, p. 77-78, 80, 82.

Coating of metal, wood, paper, cloth, or plastic surfaces with rayon or cotton flock.

7-432. Chemical Polishing of Aluminum. Charles C. Cohn. *Western Machinery and Steel World,* v. 38, Oct. 1947, p. 102.

Advantages of chemical over electrolytic polishing. Properties and requirements common to both processes.

7-433. Pore Size in Protective Films by Electrographic Printing. W. E. Shaw and E. T. Moore. *Analytical Chemistry,* v. 19, Oct. 1947, p. 777-779.

Technique for determining porosity in protective coatings which involves the use of a sandwich consisting of metal pressure platens, a sheet of absorptive paper in contact with the area of coated metal to be studied, and the proper electrolyte. Pressure, voltage, and time, as well as developing agent, are important for proper printing.

7-434. Porcelain Enameled Products in the Home. W. H. Pfeiffer. *Engineering Experiment Station News (Ohio State University),* v. 19, Oct. 1947, p. 16-23.

Manufacture and properties.

7-435. Oxide Conditioning Speeds Pickling Operations. C. B. Murton, Jr., and M. F. Hawkes. *Iron Age,* v. 160, Oct. 30, 1947, p. 46-48.

The various oxide components and the manner in which they affect pickling. Methods of oxide conditioning to obtain rapid and efficient scale removal.

7-436. Production-Line Rustproofing. A. D. Stout, Jr. *Iron Age,* v. 160, Oct. 30, 1947, p. 64-65.

Production-line methods at Newark Stove Co.—the first major installation of the new Banox rustproofing process, developed by Calgon, Inc.

7-437. Bright Annealing for Cleaning Kitchenware Prior to Porcelain Enameling. Albert R. Mallonn. *Finish,* v. 4, Nov. 1947, p. 20-21, 53, 56.

An outline of equipment, costs, and results based on 16 months' experience. (From paper presented at Porcelain Enamel Institute's 9th Annual Forum, Columbus, Ohio.)

7-438. Program Report of Ninth Annual P.E.I. Forum. (Continued.) *Finish,* v. 4, Nov. 1947, p. 22-25, 38, 40.

Authors' résumés or excerpts of following papers: Spray pickling, by H.

C. Ellinger. Immersion tubes, open pressure burner fired, by S. E. Shepard. Fuel oils in porcelain enameling, by William M. Jones. Use of propane and butane at enameling plants, by E. A. Jamison.

7-439. A Two Continuous Furnace Plant for Stove Work and Jobbing. Val J. Cichowski. *Finish,* v. 4, Nov. 1947, p. 15-18, 61-62.

Enameling plant for high-speed production of flatware using two furnaces, one for ground coat and one for white coat.

7-440. Symposium on Modern Metal Protection. *Steel,* v. 121, Nov. 3, 1947, p. 90-91, 122, 124, 126, 128, 131-132, 134.

Condensed versions of seven papers presented at meeting sponsored by American Chemical Society, American Institute of Chemical Engineers, and Electrochemical Society at Cleveland: Selection of protective coatings for metals, by K. G. Compton. Organic coatings for corrosion protection, by George W. Seagren. Synthetic rubber derivatives as corrosion resistant coatings, by J. B. Martin. Protective coatings for high-temperature applications, by W. N. Harrison. Corrosion resistant chemical equipment of stainless steel, by W. R. Meyer and H. L. Maxwell. Corrosion resistance of nickel-base alloys and applications in processing equipment, by R. B. Long. Some notes on corrosion behavior of high-nickel alloys and stainless steels, by H. O. Teeple.

7-441. How to Clean Metals. Harry S. Wharen. *American Machinist,* v. 91, Nov. 6, 1947, p. 109-124.

Report deals largely with steel, and metal cleaning as a manufacturing process. The various cleaning materials and methods: solvent cleaners; emulsifiable cleaners; alkaline cleaners; acid pickling; and dip and spray rinsing.

7-442. *Reynolds Metals Technical Advisor,* v. 1, no. 5, 1947, p. 1.

Recommendations for cleaning, surface treatment, and priming.

7-443. Regalvanizing of Welded Joints. George H. Ohmer. *Corrosion,* v. 3, Nov. 1947, p. 580-584.

Procedure for application of low-melting zinc-base alloy to areas on galvanized objects where the original zinc coating has been destroyed by welding or by other means.

7-444. Discussion of Paper, Chemical Reaction in Metal Protective Paints. W. Beck *Corrosion,* v. 3, Nov. 1947, p. 593-594.

E. J. Dunn found a remarkable drop in the acid number of extracted, dried, linseed-paint films when these contained reactive lead oxide pigments (Aug. issue of *Corrosion*—see item 7-322). W. Beck has measured the pH of the swelling water of the paint film and confirms the author's results.

7-445. Production Metalizing for Surface Protection. Robert Steele. *Production Engineering & Management,* v. 20, Nov. 1947, p. 56-59.

Automatic equipment for the application of a protective coating to arc welded sections solves the problem of replacing the burned-off galvanizing.

7-446. Possibilities of Zinc Coatings on Drill Pipe. L. R. Jackson, H. M. Banta, R. C. McMaster, and J. Bernbaum. *Drilling Contractor,* v. 3, Oct. 15, 1947, p. 50-51.

Zinc plating, even when scratched, greatly prolongs the operating life of steel under test conditions simulating drill-string service. Zinc coating stood up much better than plastic coatings under the same test conditions.

7-447. Painting, Varnishing and Lacquering of Light Metal Surfaces; Continental Practice. A. K. Overrath and Edmund R. Thews. *Paint and Varnish Production Manager,* v. 27, Nov. 1947, p. 295-298, 300.

The problems involved; recommended materials and procedures.

7-448. Functions of Organic Coatings in Present-Day Engineering Problems. J. J. Mattiello. *Paint and Varnish Production Manager,* v. 27, Nov. 1947, p. 300-304.

Surface preparation; electrical insulation; food and chemical containers—metal; marine paints; structural steel painting; naval aircraft; railroad paints; infrared reflecting paints; other engineering fields; plastics vs. organic coatings; economics.

7-449. New Enamel Plant Geared for Top Production. *Ceramic Industry,* v. 49, Nov. 1947, p. 65-66, 112, 114, 116.

Procedures, equipment, and layout for electric range production.

7-450. Beautyware Finishes. Bryant W. Pocock. *Products Finishing,* v. 12, Nov. 1947, p. 20-22, 24, 26, 28, 30, 32.

Procedures used in making bathtubs, lavatories, and sinks.

7-451. Glycerine in Electrolytic Treatment of Aluminum and Its Alloys. Georgia Leffingwell and Milton A. Lesser. *Products Finishing,* v. 12, Nov. 1947, p. 36, 38, 40, 42, 44, 46.

A review. 22 ref.

7-452. Finishing Clinic. Allen G. Gray. *Products Finishing,* v. 12, Nov. 1947, p. 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72.

Recent developments in the use of conversion coatings on zinc-plated steel; advantages of automatic hot zinc galvanizing in production units;

proper surface preparation for porcelain enameling; determination of adhesion of plated coatings on aluminum.

7-453. Barrel Finishing of Metal Products. Part 15—A Discussion Concerning Barrel Loads and Barrel Speeds. H. Leroy Beaver. *Products Finishing,* v. 12, Nov. 1947, p. 76, 78, 80, 82, 84, 86, 88.

7-454. Practical Applications of Modern Products. *Products Finishing,* v. 12, Nov. 1947, p. 90, 92, 94, 96, 98.

Elevator interiors are finished to retain tonal values and reflectiveness. Phosphatizing process utilizes gas immersion heaters.

7-455. Sur Les Etats de Surface Actif et Passif Créés par le Polissage Electrolytique sur l'Aluminium, le Zinc et le Fer. (Concerning the Active and Passive Surface States Created by Electropolishing Aluminum, Zinc, and Iron.) Pierre Morize. *Métaux et Corrosion,* v. 22, May 1947, p. 71-80; June 1947, p. 101-108.

The oxidation of the surfaces of metals, particularly aluminum, zinc, and iron. Both mechanically polished and electropolished surfaces are studied with particular emphasis on the latter. The relation between solution potential and crystal structure. Oxidation of zinc at room temperature, based on solution potentials. 43 ref.

7-456. Passivation des Aciers Inoxydables. (Passivation of Stainless Steels. Parts III and IV.) (Concluded.) L. Guitton. *Métaux et Corrosion,* v. 22, May 1947, p. 80-89.

Successful application of laboratory work on passivation of 18% Cr-8% Ni-3% Mo and 18% Cr-10% Mn stainless steels on a semicommercial scale.

7-457. A Note on the Electrolytic Polishing of Silver. R. Shuttleworth, R. King, and Bruce Chalmers. *Metal Treatment,* v. 14, Autumn 1947, p. 161-163.

Simple method for the electrolytic polishing of relatively large areas of silver without preliminary grinding on emery paper.

7-458. Chromate Passivation of Sprayed Zinc Coatings. E. E. Halls. *Metal Treatment,* v. 14, Autumn 1947, p. 164-168.

Corrosion tests on sprayed zinc coatings on steel with particular reference to use of sulphuric acid-sodium dichromate solution.

7-459. La Peinture de l'Aluminium. (Painting of Aluminum. Part I.) J. J. Meynis de Paulin. *Revue de l'Aluminium,* v. 24, Oct. 1947, p. 309-317.

Preparation of the surface of light alloys, particularly aluminum alloys, for painting or other finishing operations. Various methods of degreasing and cleaning as well as chemical and anodic oxidation. Methods of application.

7-460. Modern Mechanical Surface Finishing. Martin Manler. *Metal Finishing,* v. 45, Nov. 1947, p. 62-66.

A review of equipment, procedures and materials. 17 ref. (To be cont.)

7-461. Pretreatment for Barrel Plating. Mario Mazzone and Floyd McKnight. *Metal Finishing,* v. 45, Nov. 1947, p. 75-77, 82.

Practical recommendations for chemical and mechanical surface treatments prior to the plating operation.

7-462. Tricks of the Polishing Trade. H. Moore. *Metal Finishing,* v. 45, Nov. 1947, p. 78-79.

Practical hints on holders for polishing and buffing parts which are otherwise difficult to handle.

7-463. Painless Finish for Stainless. *Industrial and Engineering Chemistry,* v. 39, Nov. 1947, p. 14A, 16A.

Use of new electropolishing solution developed by Du Pont for stainless steels.

7-464. Tarnishing and Related Phenomena. U. R. Evans. *Sheet Metal Industries,* v. 24, Nov. 1947, p. 2189-2193, 2205.

A mathematical analysis of the principles of film growth and methods of improving resistance to tarnishing, including carefully controlled composition and pretreatment of alloys (selective oxidation, and electrodeposition of protective beryllia and alloy coatings). 22 ref. (Presented at the 3rd International Conference on Electrodeposition of the Electrodepositors' Technical Society, London.)

7-465. A Survey of Modern Methods for the Application of Paint to Metal Surfaces. J. N. T. Adcock. *Sheet Metal Industries,* v. 24, Nov. 1947, p. 2227-2232.

Pretreatment, baking procedures, application methods. (Presented at Autumn Conference of Sheet and Strip Metal Users' Technical Assoc.)

7-466. Some Special Applications of the Electrolytic Polishing of Metals. H. C. J. de Decker, A. P. Krijff, and J. M. Pluut. *Sheet Metal Industries,* v. 24, Nov. 1947, p. 2235-2242.

Electrolytic polishing methods for carbon steels, zinc alloys, and lead alloys. While the primary object is to facilitate the metallographic examination of these materials considerable light is thrown on the nature of the distortion in the surface layers caused by mechanical polishing. (Presented at 3rd International Conference on Electrodeposition of the Electrodepositors' Technical Society, London.)

7-467. Production Coating Under High Vacuum. *Modern Plastics,* v. 25, Nov. 1947, p. 128.

Automatic machine for vapor deposition of metals onto plastics, paper, cloth, or glass, at pressures below 10^{-5} mm. Hg.

7-468. A Study of the Dielectric Strength of Paint, Varnish and Lacquer Films. *American Paint Journal (Convention Daily),* v. 32, Nov. 8, 1947, p. 8, 10-11, 13-15, 17-19.

Apparatus and standard technique developed. Extensive test results for different organic films on steel, copper, tin, aluminum, nickel, monel, and Inconel. The latter in the rolled and annealed state proved most suitable. Work is planned to determine whether the base-metal composition has any effect other than that due to its surface condition.

7-469. Further Investigation of Aqueous Dispersions of Vinyl Polymers. *American Paint Journal (Convention Daily),* v. 32, Nov. 8, 1947, p. 19-20, 22-30.

Continuation of work reported in 1946 by the Chicago Club on polymer dispersions. New data on compounding technique and proper methods of pigmentation. Factors governing stability were determined and a test devised by which stability can be predicted. Comparative stability of various lattices. A rapid method to determine flow properties, and the close association of flow behavior with application characteristics. Physical and chemical properties of vinyl films are compared with conventional varnish and alkyd films. Further information on Geon, Acrysol, and Saran and more recent work with Latex 512. Use of vinyl dispersions as metal finishes.

7-470. A Study of Primers for Ferrous Metals in an Atmospheric Exposure. Report III. *American Paint Journal (Convention Daily),* v. 32, Nov. 14, 1947, p. 23-28.

Details of the method of preparation and exposure procedure for the specimens of the general series outlined previously. No exposure data are available as yet.

7-471. Scale Removal. E. Bucknall. *Journal of the Birmingham Metallurgical Society,* v. 27, Sept. 1947, p. 355-363; discussion, p. 354-355, 363-377.

A general discussion applicable to both ferrous and nonferrous metals. 15 ref.

7-472. Paints in Railway Service; Some Factors Affecting Their Choice. F. G. Dunkley and D. P. Earp. *Journal of the Oil & Colour Chemists' Association,* v. 30, Oct. 1947, p. 391-417.

Surface preparation, methods of application, method of construction and nature of materials, accessibility, function, conditions of service, cleaning, and other related topics. Details of test procedures used by British Railway Co.

7-473. Design of Exhaust Systems. F. H. Stebbins. *Sheet Metal Worker,* v. 38, Nov. 1947, p. 59-61.

Paint spray-booth system.

7-474. Evaluating the Workability of Sheet Steel Ground Coats. E. E. Howe and L. A Johnson. *Better Enameling,* v. 18, Nov. 1947, p. 6-10, 34.

Three test procedures; comparative test data on three commercial frit combinations. (To be continued.)

7-475. The Development of Porcelain Enameled Kitchen Utensils During the Period 1941-1947. F. A. Petersen. *Better Enameling,* v. 18, Nov. 1947, p. 11-13.

Changes in enamel thickness, impact, thermal shock, and solubility resistance of enameled kitchen utensils.

7-476. Seeger Refrigerator Co. Pioneers the Use of Porcelain Enamel in the Freezer Field. *Better Enameling,* v. 18, Nov. 1947, p. 14-19.

Procedures, layout, and equipment in manufacture of Coldspot home freezers.

7-477. Factors to Consider in Hot Dip Galvanizing. Part II. (Concluded.) A. D. Wilcox. *Industrial Heating,* v. 14, Nov. 1947, p. 1812, 1814, 1816, 1818, 1820, 1856.

Construction of galvanizing kettles; application of heat to the kettle, with special reference to placing of the burners; methods of heating the kettles; the importance of proper temperature control and methods of attaining it; burner selection.

7-478. Painting and Enameling of Domestic Units at "Hotpoint" Appliance Plant. Part II. *Industrial Heating,* v. 14, Nov. 1947, p. 1879-1880, 1882, 1884, 1886-1888.

The porcelain-enameling installation, including the enamel-firing furnaces, and automatic and visual methods of color grading.

7-479. Surface Preparation of Semifinished Toolsteel. S. F. Magis. *Iron and Steel Engineer,* v. 24, Nov. 1947, p. 78-91; discussion, p. 91.

Chipping, grinding, and some of the metallurgical methods employed in maintaining the surface quality of semifinished toolsteel for rolling and forging. Illustrated. (Presented at A.I.S.E. Philadelphia District Section Meeting, Dec. 7, 1946.)

7-480. Cleaning and Spray Pickling. H. C. Ellinger. *Enamelist,* v. 24, Nov. 1947, p. 17-20, 60.

Presented at the 9th Annual Forum, Porcelain Enamel Institute, Columbus, Ohio, Sept. 10-12, 1947.

7-481. Finishing Setup for a Variety of Metal Products. Fred M. Burt. *Industrial Finishing,* v. 24, Nov. 1947, p. 36-40, 42.

Procedures and equipment for finishing die-cast products of aluminum, magnesium, zinc, and manganese bronze.

7-482. Surface Preparation and Painting Setup. *Industrial Finishing,* v. 24, Nov. 1947, p. 42, 44.
New 5-stage conveyerized Bonderizing system.

7-483. The Pullman-Standard Finish. W. J. Boltze. *Industrial Finishing,* v. 24, Nov. 1947, p. 54-56, 60, 62.
Methods used in painting and decorating modern streamlined passenger cars. (To be continued.)

7-484. Automatic Finishing Setup for Refrigerator Cabinets. *Industrial Finishing,* v. 24, Nov. 1947, p. 64, 66.

7-485. Tumble Finishing Toys. Howard Ford. *Industrial Finishing,* v. 24, Nov. 1947, p. 71-72.
Use of barrel finishing for application of paint to small metal toys found in boxes of popcorn.

7-486 Protective Metallic Coatings From Molten Salts Harry R. Hoge. *Metal Progress,* v. 52, Nov. 1947, p. 819-823.
Wartime study of methods, for producing a uniformly thin, yet continuous, metallic layer so thin that fine dimensional tolerances would not be disturbed, led to the use of fused baths of certain metallic salts. One such bath consisted of tin chloride, either pure or diluted with relatively small amounts of ammonium or other chlorides, or having some metallic tin dissolved in it. Action of such baths on steel articles.

7-487. Phosphate and Colored Plastic Coatings. George H. Pimbley. *Organic Finishing,* v. 8, Nov. 1947, p. 9, 13, 15, 17, 64.
Dual process for protection and decoration of metals.

7-488. Some Aspects of Metal Finishing. H. H. Zimmerman. *Organic Finishing,* v. 8, Nov. 1947, p. 19-29.
Methods of finishing, used for metal furniture, counters and shelving.

7-489. Naval Air Station Resin Coating Shops. George W. Grupp. *Organic Finishing,* v. 8, Nov. 1947, p. 47-49.
Procedures and equipment for cleaning and finishing of metal surfaces.

7-490. Operating the World's Largest Porcelain Enameling Plant. Dan J. Cherry and Robert J. Baker. *Finish,* v. 4, Dec. 1947, p. 15-19, 32-33.
Production of all-porcelain refrigerator cabinets, all-porcelain automatic washers, electric ranges, and porcelain parts for refrigerators, water coolers, and water heaters at Frigidaire.

7-491. The Surface Preparation of Aluminum for Paint Systems. *Aluminium and the Non-Ferrous Review,* v. 12, July-Sept. 1947, p. 54, 56.
Condensed from brochure issued by Northern Aluminium Company, Ltd., Banbury, Oxon, England.

7-492. Electroless Plating on Metals by Chemical Reduction. *Steel Processing,* v. 33, Nov. 1947, p. 677-678, 687.
New process developed at National Bureau of Standards for plating nickel and cobalt on metal surfaces without use of electric current.

7-493. How to Choose the Correct Type of Porcelain Enamel for Specific Applications. J. E. Hansen. *Steel Processing,* v. 33, Nov. 1947, p. 688-693.
Presented at 9th Annual Porcelain Enamel Institute Forum, Columbus, Ohio, Sept. 10-12, 1947.

7-494. Roto-Finishing Method for Processing Metals. C. H. Castle. *Machine and Tool Blue Book,* v. 43, Dec. 1947, p. 158-160, 162, 164, 166, 168.
Roto-Finishing is fundamentally a barreling method employing wet mixtures of specially developed chips and compound for finishing ferrous and nonferrous metals and alloys. Principles and applications.

7-495. Simple Dip Finish. *Die Castings,* v. 5, Dec. 1947, p. 59-61.
A simple zinc plate followed by a Unichrome clear dip produces a clear conversion coating which looks like chromium plate when applied to die castings. The dip treatment forms a clear conversion coating consisting of zinc oxide and zinc chromate, which has the same kind of eye appeal as chromium plate.

7-496. Practical Facts About Polishing and Buffing Compounds. Part II. Howard J. McAleer. *Die Castings,* v. 5, Dec. 1947, p. 62, 64, 66.
What is accomplished by buffing and polishing; the types of compounds employed; abrasives and binders; methods of spray gun application.

7-497. What You Don't See. *Refrigeration Industry,* v. 4, Dec. 1947, p. 38-39.
Phosphating and enameling procedures used in manufacturing refrigeration equipment.

7-498. Barrel Polishing of Small Brass Parts. T. S. Blair. *Iron Age,* v. 160, Dec. 4, 1947, p. 77.
Polishing of small brass paper fasteners using dry maple sawdust.

7-499. Health Hazards of Metal Cleaning Compounds. P. M. Van Arsdell. *Organic Finishing,* v. 8, Nov. 1947, p. 30-33, 36-41.
Hazards from alkaline cleaners and hydrocarbon solvents. 11 ref. (To be continued.)

7-500. Selection of Protective Coatings. K. G. Compton. *Canadian Chemistry and Process Industries,* v. 31, Nov. 1947, p. 1027-1030, 1033.

The electrochemical theory of corrosion; types of coatings; testing of coatings; and selection.

7-501. Deposition of Nickel and Cobalt by Chemical Reduction. Abner Brenner and Grace Riddell. *Journal of Research of the National Bureau of Standards*, v. 39, Nov. 1947, p. 385-395.

Extension of process developed for depositing nickel and cobalt from hot solutions of hypophosphite without the use of current to include deposition of nickel from acid solutions and of cobalt and cobalt-nickel alloys from ammoniacal solutions.

7-502. Abrasive Tumbling Reduces Finishing Cost. Vallory H. Laughner. *Machinery*, v. 54, Dec. 1947, p. 139-146.

New applications for deburring, cleaning, and finishing operations both in job shops and high-production plants.

7-503. Electrolytic Polishing of Carbon-Manganese Steel. Charles L. Faust. *Monthly Review*, v. 34, Dec. 1947, p. 1365-1366, 1399.

Critically reviews paper by W. A. Spark, *Journal of the Electrodepositors' Technical Society*, v. 21, 1946, p. 245.

7-504. Organic Finishes for Metals. H. R. Clauser. *Materials & Methods*, v. 26, Dec. 1947, p. 95-106.

Selection of finishes; composition of organic finishes; undercoats; finish coats.

7-505. The Electrolytic Polishing of Brass Pressings. P. Berger. *Sheet Metal Industries*, v. 24, Dec. 1947, p. 2437-2443.

Of three processes described in the patent literature only the chromic acid process gave good results. However, it was necessary to modify this process considerably. Compositions and operating procedures. Applicability to various alloys and to plant layout and procedures.

7-506. Cleaning and Phosphate-Coating Home Appliances at Hotpoint, Inc. Norman P. Gentieu. *Products Finishing*, v 12, Dec. 1947, p. 16-18, 20, 22, 24.

7-507. Barrel Finishing of Metal Products. Part 16—A Discussion of Round Cylinder Barrels as Distinguished From Six or Eight-Panel Barrels. H. Leroy Beaver. *Products Finishing*, v. 12, Dec. 1947, p. 28, 30, 32, 34, 36, 38, 40.

7-508. Some Information on Lithium-Bearing Ground Coat Enamels. Paul A. Huppert. *Better Enameling*, v. 18, Dec. 1947, p. 6-7, 35.

One series of tests using a special steel not yet considered suitable for porcelain enameling, and using regular enameling stock and another involving a ground coat into which was introduced various amounts of lithium manganite.

7-509 Evaluating the Workability of Sheet Steel Ground Coats. (Concluded.) E. E. Howe and L. A. Johnson. *Better Enameling*, v. 18, Dec. 1947, p. 8-10, 30.

Test procedures used to evaluate resistance to copperheading, compatibility with other ground-coat compositions, surface texture, and thermal expansion.

7-510. New Processes of Porcelain Enameling. F. L. Meacham. *Better Enameling*, v. 18, Dec. 1947, p. 18, 29.

New processes contemplate the application of a finish coat directly to the metal, eliminating the conventional ground coat now used and, in some instances, a much lower enameling temperature. Both of these contemplated changes presuppose the use of new types of enameling steels with or without special surface treatment.

7-511. Applications of Zinc Coatings by Hot Dipping. Robert Steele. *Metal Finishing*, v. 45, Dec. 1947, p. 71-76.

Two major operations are involved in galvanizing: preparing the surface and immersion in a bath of molten zinc. Variations of the final coating or speltering; the equipment required; character of the coatings; pickling processes.

7-512. Testing of Alkaline Metal Cleaners. A. Mankowich. *Metal Finishing*, v. 45, Dec. 1947, p. 77-78, 88.

The limitations and advantages of various methods.

7-513. Modern Mechanical Surface Finishing. (Concluded.) Martin Manler. *Metal Finishing*, v. 45, Dec. 1947, p. 82-88.

Various factors affecting the efficiency of polishing wheels, buffs, belts, and buffing compounds, with emphasis on the variations required for different metals.

7-514. Precision Tumbling Metal Parts. R. M. Lord. *Steel*, v. 121, Dec. 15, 1947, p 93-94, 124.

Using specially prepared abrasives, the process is successful in operations such as cleaning, deburring, forming radii, surface finishing, and removing plating and paint.

7-515. Fine-Grit Lubricated Belt Finishing. A. D. Stout, Jr. *Iron Age*, v. 160, Dec. 18, 1947, p. 68-71.

Some typical production operations, in which the finished product has been improved by use of proper lubricants for abrasive belts. Special equipment developed for polishing zinc and stainless sheet.

7-516. Properties Physico-Chimiques Réelles des Surfaces Métalliques Mises en Evidence par le Polissage Electrolytique. (True Physical-Chemical Properties of Metal Surfaces as Shown by

Electropolishing.) P. Lacombe, P. Morize, and G. Chaudron. *Revue de Metallurgie,* v. 44, March-April 1947, p. 87-90.
Cases where electropolishing does not impart passivity to metals. Reasons for passivity and a systematic study of the dissolution potential of electropolishing baths. The presence or absence of oxide surface layers. 10 ref.

7-517. Carbonate Anodizing of Aluminum Alloys. Part I. Anodization of Duralumin Under Variable Electrical Operating Conditions of the Bath A. F. Bogoiavlenskii. *Journal of Applied Chemistry (U.S.S.R.),* v. 20, June 1947, p. 532-538. (In Russian.)
By anodizing duralumin using carbonate baths, it is possible to obtain corrosion resistant films. The film obtained using direct current is characterized by maximum compactness. 12 ref.

7-518. L'Ossidazione Chimica Dell'Alluminio e Delle Sue Leghe. (Chemical Oxidation of Aluminum and Its Alloys.) *Alluminio,* v. 16, July-Aug. 1947, p. Nd091-Nd097.
The principal processes are the German MBV and EW processes and the Alcoa (Alrok) process. Bath compositions and advantages and disadvantages of each process.

7-519. Nagot om Inhibitorer och Deras Anvandning vid Betning. (Note on Inhibitors and Their Application in Pickling.) S. V. Ekstrom. *Finish (Sweden),* v. 4, Oct. 1947, p. 220-222.
Effect of adding inhibitors to pickling baths for steel. Composition of the baths claimed to be most effective.

7-520. Metallic Pigments; Electrolytic Functions in Protective Paints. J. E. O. Mayne. *Paint Manufacture,* v. 17, Nov. 1947, p. 380-382.
Cathodic protection is afforded only by zinc dust in paints, since aluminum and magnesium in paints do not provide metallic contact through the interposition of a nonconducting oxide skin.

7-521. Zinc as an Anticorrosive. A. H. Stuart. *Paint Manufacture,* v. 17, Nov. 1947, p. 383-385.
A possible mechanism by which zinc functions as an anticorrosive pigment.

7-522. Past—Present—Future of Metal Decorating. Clarence W. Dickinson. *National Lithographer,* v. 54, Dec. 1947, p. 26-27, 82, 86.
Method for applying printed designs to cans.

7-523. Cleaning Today's Steels for Porcelain Enameling. R. W. Armour. *Enamelist,* v. 24, Dec. 1947, p. 16-23.
Pros and cons of various processes. (Presented at meeting of Pacific Coast Enamelers' Club, Los Angeles.)

7-524. Surface Preparation of Semifinished Steel. John W. Deimler. *Iron and Steel Engineer,* v. 24, Dec. 1947, p. 48-50; discussion, p. 50.
Use of the mechanical chipper. Best economies are attained on billets larger than 4x4 in. and longer than 5 ft. (Presented at A.I.S.E. Philadelphia District Section Meeting, Dec. 7, 1946.)

7-525. What Is a "Clean" Surface? Ernest H. Lyons, Jr. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 281-287; discussion, p. 287-295.
Cleaning prior to electrodeposition.

7-526. Bright Dipping. Gustaf Soderberg. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 297-302; discussion, p. 303-305.
Previously annotated in R.M.L., v. 2, 1945.

7-527. Methods of Preparation of Aluminum for Electrodeposition. Helmer Bengston. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 307-319; discussion, p. 319-324.
Previously annotated in R.M.L., v. 3, 1946.

7-528. Anodic Coatings With Crystalline Structure on Aluminum. Cyril S. Taylor, C. M. Tucker, and Junius D. Edwards. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 325-332; discussion, p. 332-333.
Previously annotated in R.M.L., v. 2, 1945.

7-529. The Effect of Various Surface Treatments in Cleaning and Preparing Copper, Nickel and Steel for Chromium Plating. William M. Tucker and Robert L. Flint. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 335-355; discussion, p. 355-358.
Previously annotated in R.M.L., v. 3, 1946.

7-530. Protective Organic Coatings as Engineering Materials. Joseph J. Mattiello. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 493-592.
As the 20th Edgar Marburg Lecture, the author presents an extensive illustrated survey of the above subject, mainly from the practical point of view. 54 ref. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

SECTION VIII

ELECTROPLATING

8-1. Bright Nickel Plating. A. F. Brockington. *Metal Industry,* v. 69, Dec. 6, 1946, p. 468-470.

Advantages and disadvantages of solutions of the Watts type for obtaining a bright nickel deposit that does not require mopping. Particulars of the structure of deposits, types of solution, brightening agents, alloy deposits of cobalt-nickel, and typical bright plating equipment are given. (To be concluded.)

8-2. The Control of pH in Nickel Plating Solutions. H. Bandes. *Electrochemical Society Preprint* 90-34, 1946, 14 p.

Equations for computing the amount of acid or base necessary to lower or raise the pH of a nickel plating solution a given amount. Equations were derived from experimental potentiometric titration data. Procedure for carrying out the titrations and significance of the results to the nickel plating process.

8-3. AC Die Casting and Plating Operations. Joseph Geschelin. *Automotive and Aviation Industries,* v. 95, Dec. 15. 1946, p. 30-31, 100.

Manufacture of two zinc die-cast instrument panels and a long single bar radiator grille section at AC Spark Plug Division. Sequence of operations through the plating department.

8-4. Cadmium Plate and Passivated Cadmium-Plate Coatings. Frank Taylor. *Metallurgia,* v. 35, Nov. 1946, p. 28-31.

Dealing with the passivation of zinc and cadmium surfaces, Mr. Taylor comments on Mr. Halls' article published in October 1946. Hints at government research which could give correct picture of relative advantages. Passivating a surface gives outstanding advantages.

8-5. Principles of Electrodeposition. *Electrotypers & Stereotypers Journal,* v. 10, March 1946, p. 162-163; April 1946, p. 188-189; May 1946, p. 216-217; June 1946, p. 228-229; July 1946, p. 12-13; Aug. 1946, p. 28-29; Oct. 1946, p. 68-69.

Nickel plating of stereotype plates is described in considerable detail in this series. Includes theory as well as practice. (To be continued.)

8-6. Electroforming for Precision. H. R. Clauser. *Scientific American,* v. 176. Jan. 1947, p. 15-17.

Three matrix techniques; metals formed by the process; advantages; a few examples of applications.

8-7. Bright Nickel Plating. (Concluded.) A. F. Brockington. *Metal Industry,* v. 69, Dec. 20, 1946, p. 513-514.

Effect of various contaminants upon the solution and the methods that have been devised for their removal. Fully automatic bright nickel and chromium plating plant.

8-8. Longer Life for Piston Rings Predicted With Chrome Plating. *S.A.E. Journal,* v. 55, Jan. 1947, p. 69-70.

Tests show chromium plating the piston-ring periphery will increase ring life and decrease ring troubles. Installation of a chromium-plated compression ring in the top groove nearly doubles the life of the rest of the rings. If all the rings are plated, their durability is quadrupled. (Digest of paper "Development of Chrome Plated Piston Rings for Aircraft Engines" by J. B. Minnich, presented at the S.A.E. National Meeting, Oct. 4, 1946.)

8-9. Plating With Platinum, Palladium and Rhodium. H. M. Haberman. *Metal Finishing,* v. 45, Jan. 1946, p. 56-58.

Various plating bath compositions and method of preparation.

8-10. The Hull Cell. H. J. Sedusky and J. B. Mohler. *Metal Finishing,* v. 45, Jan. 1947, p. 59-63.

Various examples of use of the Hull test which covers the entire plating range of current densities in one operation.

8-11. Electroforming. E. A. Ollard. *Metal Industry,* v. 70, Jan. 3, 1947, p. 6-8.

Reproduction of articles by electroforming; materials, types of mold, conducting surfaces, connections, coverings, types of metal and solution formulas. (To be continued.)

8-12. Control Apparatus for the Production of Uniform Electrodeposits From a Rectified A. C. Supply. D. Ashby and S. Wernick. *Monthly Review,* v. 34, Jan. 1947, p. 42-49.

Some of the control equipment used in British industry.

8-13. Comparison of Electroplated Finishes Under Humidity (K.110) Test. *Metallurgia,* v. 35, Dec. 1946, p. 63-64.

Illustrates the effect of 21 cycles in the humidity chamber, operating at 60° C. and at 100% relative humidity. Relative merits of the respective deposits—cadmium, cadmium chromate passivated, zinc chromate passivated, zinc phosphate passivated, nickel, nickel and tin, tin and zinc when subjected to tropical conditions. Comparisons of results indicate that under the conditions of the standard (K.110) test, chromate passivation in the case of cadmium and zinc is definitely advantageous and beneficial.

8-14. Hard Chrome Plating Finds Wide Use at Ford. Herbert Chase. *Iron Age,* v 159, Jan. 30, 1947, p. 51-53.

A sizable department is maintained for preparing tools and gages, resurfacing parts machined undersize, and for providing surfaces to resist wear in normal service. Applications, handling methods, preplating and stop-off techniques and baths.

8-15. A New Process for Bright Copper Plating. Harold Leever. *Materials & Methods,* v. 25, Jan. 1947, p. 82-84.

New process developed by MacDermid, Inc., Waterbury, Conn. A modified cyanide-type copper solution, with two addition agents, is used. Smooth deposits are claimed from even comparatively dirty solutions.

8-16. Hard Chromium. *Materials & Methods,* v. 25, Jan. 1947, p. 128.

Methods used in application of relatively thick chromium plating, properties of the plate, and applications of the process. (Condensed from paper by D. Chambaud, *Mecanique,* July 1946, p. 175-177.)

8-17. The Control and Maintenance of Electroplating Solutions. Part I. (Continued.) P. Berger. *Sheet Metal Industries,* v. 24, Jan. 1947, p. 135-140.

Acid copper solution, and brass and silver solutions. (To be continued.)

8-18. Synchronized Stamping and Plating. Daniel Dewey. *Steel,* v. 120, Feb. 3, 1947, p. 94-96.

Modern equipment and procedures involved in manufacture of bumper guards, hub caps and other automobile parts. Current plating schedule requires about 90,000 amp. of generator capacity, 35,000 gal. of nickel solution and 3000 gal. of chromium solution per day. Complete laboratory is maintained for regular analysis of the cleaning and plating solutions, as well as for determining plate thickness and salt spray testing.

8-19. Electroforming. (Continued.) E. A. Ollard. *Metal Industry,* v. 70, Jan. 17, 1947, p. 51-53.

Piece part production by electrodeposition. (To be continued.)

8-20. Deposition of Chromium From Chromic Acid Solutions. W. L. Guthrie and F. L. Clifton. *Monthly Review,* v. 34, Feb. 1947, p. 140-153.

Two related methods for determining the characteristics of chromium plating solutions. Only one temperature was investigated in the "worked" baths. Agreement between the results obtained by the two methods is good enough to permit prediction of results from "worked" baths at other temperatures. The same agreement also indicates that barium hydrate can be used successfully in the control of the sulphate ion in chromium plating baths.

8-21. Effect of Impurities and Purification of Electroplating Solutions. D. T. Ewing and William D. Gordon. *Monthly Review,* v. 34, Feb. 1947, p. 180-203.

Bibliography of 666 references covers years 1901-1945, inclusive. Versatility of the method, together with other advantages of hot metal surfacing.

8-22. Mirror Bright Copper Plating. John Anthony. *Iron Age,* v. 159, Feb. 13, 1947, p. 54-55.

Brightener solution which when added to the conventional copper cyanide plating bath offers promise of lower plating costs by eliminating the need for buffing copper deposits and serves to cut down racking and handling time in the plating shop.

8-23. Periodic Reverse-Current Electroplating. George W. Jernstedt. *Metal Finishing,* v. 45, Feb. 1947, p. 68-72.

A novel, periodic reverse-current plating cycle in which plating current is reversed briefly at short periodic intervals to deplate unsound and inferior metal deposited in the previous plating period. This technique builds up many microscopically thin increments of sound metal to make a deposit more dense and of greater homogeneity than that possible with conventional continuous-current methods.

8-24. Rectifiers for Electroplating. Louis W. Reinken. *Metal Finishing,* v. 45, Feb. 1947, p. 73-77.

Basic rectifier circuits; possible difficulties with single-phase rectifiers; three-phase rectifier circuits; voltage control; tapped autotransformer voltage control.

8-25. **Electroplating at Flint's Spark Plug Division.** Bryant W. Pocock. *Products Finishing,* v. 11, Feb. 1947, p. 30-32, 34, 36, 38, 40, 42, 44, 46.

Plating department comprises two sections, the die-cast and instrument sections. Die-cast division handles the plating of copper, nickel and chromium on exterior zinc base die-cast parts such as hood ornaments, grille moldings, emblems. Instrument division takes care of similar plating on instrument bezels, retainers, cases, pointers, and trim strips, the basic metal being 1010 or 1020 steel or brass. Equipment and procedures.

8-26. **Bright Chromium Plating and Temperature Control.** M. G. Herbach and C. W. Bowden, Jr. *Metal Progress,* v. 51, Feb. 1947, p. 257-259.

Types of chromium plate; preparation for plating; control of cleaning baths; chromium plating process; control of chromium plating; details of control system; installation.

8-27. **Electroforming.** E. A. Ollard. *Metal Industry,* v. 70, Jan. 31, 1947, p. 86-88.

Control of hardness and softness of copper and nickel deposits in electrodeposition through the control of essential constituents and exclusion of impurities in solutions. Finishing of electrodeposited piece.

8-28. **Comparison of Electroplated Finishes Under Humidity Tests.** E. E. Halls. *Metallurgia,* v. 35, Jan. 1947, p. 137-139.

Comments upon data presented by Frank Taylor in December issue. Author's reply.

8-29. **Chromium Plating of Aluminum.** C. J. Hinton. *Modern Metals,* v. 3, Feb. 1947, p. 14-15.

Preparation of the surface; zinc immersion process; surface cleaning and plating.

8-30. **Electroforming. (Concluded.)** E. A. Ollard. *Metal Industry,* v. 70, Feb. 14, 1947, p. 126-128.

Methods employed for producing ornamental plaques, a copper radiator shell, a graphophone record stamper, and a detonator tube by electrodeposition.

8-31. **Surface Area of Chrome-Plated Nickel.** Callaway Brown and Herbert H. Uhlig. *Journal of the American Chemical Society,* v. 69, Feb. 1947, p. 462-465.

Low-temperature adsorption of inert gas was the technique used to measure true "accessible" area of chromium-plated surface, as opposed to apparent area. Results show 10 to 50 times as much accessible area as apparent area.

8-32. **Plating and Anodizing Aluminum.** *Light Metals,* v. 10, Jan. 1947, p. 17-19.

Bath compositions for electrodeposition on aluminum and limitations of the anodic process as a method for finishing domestic ware.

8-33. **Ammonia in Brass Plating Solution.** S. Buchan and W. D. Rae. *IRI Transactions,* v. 22, Dec. 1946, p. 221-226.

A common method for bonding rubber to metal by means of an intermediate layer of electrodeposited brass. One of the most important factors controlling the type of deposit, which in turn influences the quality of the rubber-metal adhesion, is the ammonia content of the plating solution. The mechanism of the action of the ammonia was investigated by a unique method. Ammonia reduces the efficiency of deposition, but also increases throwing power of the solution and produces a more uniform deposit.

8-34. **Problems in Plating Die Castings.** Maurice R. Caldwell. *Die Castings,* v. 5, March 1947, p. 60, 62-63.

The problems of porosity, polishing and buffing; analysis of metal; design.

8-35. **Testing of Plated Coatings on Zinc-Base Alloy Die Castings.** E. A. Anderson. *Monthly Review,* v. 34, March 1947, p. 313-318.

A study of plated zinc alloy die-cast parts taken from 1941 model cars after about five years of service. They were produced in an era of shortages and substitutions and hence were expected to include variables not ordinarily encountered. Parts selected included every plated unit then made in zinc die castings except the grille. From each part one or more areas were selected for study. In each area the thickness of coating was determined by the microscopic method with direct measurement of the magnified image at 1000 ×.

8-36. **Determination of Impurities in Electroplating Solutions. A.E.S. Research Project No. 2. Part V.** Earl J. Serfass and W S. Levine. *Monthly Review,* v. 34, March 1947, p. 320-327.

Procedure adopted for determination of manganese in nickel plating baths.

8-37. **Bright Copper Plating.** L. E. Browne. *Steel,* v. 120, March 17, 1947, p. 108, 128, 130.

Simple cyanide copper plating solution gives wide range of applications. Simple equipment and many advantages.

8-38. **Electrotin Plate. Part I. The Influence of Plating Conditions on the**

Quality of Electrotin Plate Deposited From the Stannous Sulphate Bath. R. M. Angles, K. W. Caulfield and R. Kerr. *Journal of the Society of Chemical Industry, Transactions and Communications,* v. 65, Dec. 1946, p. 430-433.

The quality of tin plate formed under different plating conditions from the stannous sulphate-cresolsulphonic acid bath was compared by the thiocyanate and hot-water porosity test and by exposure in a humidity chamber. Within the ranges examined, the quality improves with increase of tin concentration of the electrolyte and with decrease of current density. Optimum concentration of acid depends on tin content. Raising the temperature impairs the quality of the deposits. No significant improvement was obtained by addition of commercial wetting agents.

8-39. Tin Plating and Control of Tin Solution by Anode Color. John Franklin Daymude. *Products Finishing,* v. 11, March 1947, p. 42-44, 46, 48, 50, 52, 54, 56.

Instructions for the operation of a low-caustic, low-temperature tin-plating solution. Plating solution under consideration is applicable to a wide variety of base metals and possesses excellent throwing power.

8-40. Common Industrial Electroplates. Part I. Ferrous Base Metals. P. W. Prouty. *Product Engineering,* v. 18, March 1947, p. 139-142.

Guidance for plating major ferrous construction materials for industrial and commercial applications. Preferential corrosion coatings including comparison of zinc and cadmium, seal coatings of such metals as nickel, chromium, copper, and tin.

8-41. Electroplating Zinc-Base Die Castings. C. F. Nixon. *Metal Finishing,* v. 45, March 1947, p. 58-60.

Polishing, buffing, cleaning, plating, and stripping of zinc-base die castings and techniques for improving surface conditions. Methods used to finish hardware; experimental work.

8-42. Measurement of Current in Electrolytic Baths. B. A. Novikov. *Engineers' Digest (American Edition),* v. 4 March 1947, p. 101.

A new measuring instrument and technique for determining the current distribution in electroplating baths. (Condensed from *Promyshlennaya Energetika,* no. 6, 1946, p. 9-10.)

8-43. Plating on Aluminum. R. A. Ehrhardt and J. M. Guthrie. *Monthly Review,* v. 34, April 1947, p. 421-428.

A study of the zincate solutions with test procedure and results.

8-44. Porosity of Electrodeposited Metals. A.E.S. Research Project No. 6. Part I. Bibliography. N. Thon and E. T. Addison, Jr. *Monthly Review,* v. 34, April 1947, p. 445-453.

Only references which bear directly on the porosity aspect in corrosion. Bibliography is arranged chronologically and, for each year, in the alphabetical order of authors' names.

8-45. Determination of Impurities in Electroplating Solutions. A.E.S. Research Project No. 2. Part VI. Traces of Copper in Nickel Plating Baths. Earl J. Serfass and W. S. Levine. *Monthly Review,* v. 34, April 1947, p. 454-461.

Development work and procedures for colorimetric method for determination of very small amounts of copper in nickel-plating baths. Details of procedure not requiring a colorimeter.

8-46. Effect of Small Amounts of Zinc in Watts Type Nickel Depositing Solutions. G. E. Gardam. *Journal of Electrodepositors' Technical Society* (Reprint), v. 22, 1947, p. 8-13.

Not only do small traces of zinc interfere with nickel deposition but the ratio of zinc to nickel in the deposit is greater than in the solution. A number of experimental results.

8-47. Note on the Effect of Copper on Nickel Deposition. G. E. Gardam. *Journal of Electrodepositors' Technical Society* (Reprint), v. 22, 1947, p. 14.

Method used to determine the maximum amount of copper which can be used in nickel anodes without causing porous deposits. This amount was found to be 0.13 to 0.17%. Method used for determination of copper in Watts plating solution.

8-48. Method of Analysis of Chromium Plating Solutions. F. W. Salt. *Journal of Electrodepositors' Technical Society* (Reprint), v. 22, 1947, p. 15-18.

Estimation of chromic acid, trivalent chromium, and iron—including sulphuric acid, may be completed in about 1½ hr. in method described. By using oxidation-reduction indicators the inconvenience of an additional unstable reagent (potassium permanganate) is avoided. Sodium N-phenyl-anthranilate is used instead of barium diphenylamine sulphonate as indicator for the chromic acid and trivalent chromium determinations because it gives a more striking end-point, and the addition of phosphoric acid is unnecessary.

8-49. Estimation of Nickel, Cobalt, Chloride, Formate and Formaldehyde in Nickel-Cobalt Plating Solutions. F. W. Salt. *Journal of Electrodepositors' Technical Society* (Reprint), v. 22, 1947, p. 19-21.

Methods of estimation of the principal constituents of a widely used bright-nickel electroplating solution which are entirely volumetric. Boric

acid does not interfere. Where applicable the individual methods can be used for other nickel plating solutions.

8-50. Electro-Tinplate. Part II. The Influence of Coating Thickness on the Porosity and Resistance to Corrosion of Electro-Tinplate. Part III. The Influence of Pickling Conditions on the Porosity and Corrosion Resistance of Electro-Tinplate. K. W. Caulfield, R. Kerr and R. M. Angles. *Journal of the Society of Chemical Industry,* v. 66, Jan. 1947, p. 5-11.

In Part II, study was made of effect of variation in coating thickness on quality of electro-tinplate deposited from stannous sulphate and sodium stannate baths. Curves show influence of coating thickness on thiocyanate, hot-water porosity, humidity, and salt-spray test values, and effect of time of exposure out of doors on weight increment for a range of coating thicknesses. In Part III, quality of coatings from alkaline and acid baths as determined following different pickling treatments. Inhibited sulphuric acid found to be best for alkaline bath deposits; and anodic etching in sulphuric acid was best for the acid-bath type.

8-51. The Control and Maintenance of Electroplating Solutions. Part II. (Continued.) P. Berger. *Sheet Metal Industries,* v. 24, March 1947, p. 593-597.

Nickel solutions—their control and maintenance, and solution troubles. (To be continued.)

8-52. Metallography for the Electroplater. Alex Blazy and J. B. Mohler. *Metal Finishing,* v. 45, April 1947, p. 54-57.

Techniques in metallography for the examination of electroplated coatings. Equipment necessary for this type of work. An explanation of microscopic methods of interpreting electrodeposited coatings. Tables list the necessary etching reagents for the common metals and alloys, together with directions for their use.

8-53. Rectifiers for Electroplating. Part II. Louis W. Reinken. *Metal Finishing,* v. 45, April 1947, p. 58-62.

Continuously variable auto-transformer control; motor-driven variable auto-transformers; advantages and disadvantages; rectifier construction; importance of ventilation; remote and local control; rectifier capacities.

8-54. Fusing of Electrodeposited Tin Coatings. J. Falk. *Metal Finishing,* v. 45, April 1947, p. 63-65, 71.

Simplified method of obtaining extremely lustrous electroplated tin finishes by fusing of thin coatings. Equipment necessary to perform this operation and control conditions. Fused electroplated tin coatings give not only brilliance but theoretically have higher corrosion resistance because of less porosity than that of a nonfused coating.

8-55. Determination of Free Sodium Hydroxide and Sodium Carbonate in Plating Solutions. Louis Silverman. *Metal Finishing,* v. 45, April 1947, p. 72-73.

Reagents and procedure.

8-56. Brass Plating; Routine Chemical Control. H. E. Zentler-Gordon and E. R. Roberts. *Metal Finishing,* v. 45, April 1947, p. 66-69.

The analytical methods in present-day use. Rapid and accurate analysis of the plating solutions and of the deposits.

8-57. Common Industrial Electroplates. Part II. Nonferrous Base Metals. P. W. Prouty. *Product Engineering,* v. 18, April 1947, p. 155-158.

Applications and limitations of different plates for nonferrous base metals such as copper, brass, and bronze. Plating with such metals as tin, nickel, and silver; plating on zinc die castings and aluminum parts. Summary of general plating practice shown on a chart.

8-58. Precision Plating of Bearing Alloys. R. A. Schaefer. *Iron Age,* v. 159, April 10, 1947, p. 60-63.

Development of methods for precision plating of bearing alloys, which compete with present commercial casting processes and are equivalent or superior in performance because of the added advantage of more accurately controlled mechanical dimensions of the bearing materials. Fundamentals of trimetal bearings, and data on plating procedures for both ferrous and nonferrous bases, bath compositions, and rack design.

8-59. Contribution a l'Etude du Zingage Electrolytique Brillant en Solution Cyanurée Additionnée de Sulfure de Sodium. (Electrolytic Bright Zinc Plating Using a Cyanide Bath With Added Sodium Sulphide.) Marcel Ballay and Pierre Vogt. *Métaux et Corrosion,* v. 21, July 1946, p. 89-91.

A cyanide bath for zinc plating does not produce a highly reflective surface. The same bath with addition of 2 g. per liter of crystallized sodium sulphide results in a bright coating. It is believed that the formation of colloidal zinc sulphide is responsible.

8-60. Electrodeposited Silver on Steel for Glass-to-Metal Seals. Norman S. Freedman. *Electrochemical Society Preprint 91-19,* 1947, 11 p.

The development of a glass-to-silver-plated steel disk-type seal used in the manufacture of electron tubes designed for high-frequency operation. The plating process produces a layer of silver on steel which satisfactorily

withstands high-temperature processing. Tests indicate that the bond between silver and steel is improved when diffusion of silver into iron and iron into silver takes place.

8-61. Copper Plating in Alkanesulphonic Acid Baths. C. L. Faust, B. Agruss, E. L. Combs, and Wayne A. Proell. *Monthly Review,* v. 34, May 1947, p. 541-549.

Plating conditions for depositing copper at current densities of 60 to 1000 asf. from baths based on alkanesulphonic acids. Semibright plate is deposited without the need for addition agents, and it, as well as matte plate, is easily color buffed on wheels or electrolytically. Bright nickel, deposited directly over the semibright copper has good color. Effect of variation in operating factors, as reflected in plating results, is discussed for four sets of plating ranges. (To be continued.)

8-62. Porosity of Electrodeposited Metals. A. E. S. Resarch Project No. 6. Part II. Critical Literature Review. N. Thon and E. T. Addison, Jr. *Monthly Review,* v. 34, May 1947, p. 568-576.

History, methods of demonstration, and evaluation of porosity. (To be continued.)

8-63. Production Clinic for Finishing Die Castings. *Die Castings,* v. 5, May 1947, p. 57-58, 60.

Essential specifications for proper plating of zinc-base die castings; Chrysler specifications for plating of zinc-base die castings and solutions recommended by New Jersey Zinc Co.; mechanical treatments for magnesium die castings; and chemical treatments for aluminum die castings.

8-64. Wartime Plating Developments in England. A. W. Hothersall. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions),* 1946, p. 1-16.

Largely a review of published work; not comprehensive, but confined to those developments with which the author has been personally acquainted. 33 ref.

8-65. Summary of Wartime Research on Plating at the National Bureau of Standards. William Blum. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions),* 1946, p. 16-21; discussion, p. 21-23.

Only projects with which the Bureau had some direct connection.

8-66. Nickel Plating on Steel by Chemical Reduction. Abner Brenner and Grace E. Riddell. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions),* 1946, p. 23-29; discussion, p. 31-33.

Process by which the deposition of nickel is brought about by chemical reduction of a nickel salt with hypophosphites in a hot ammoniacal solution.

8-67. Purification of Rhodium Plating Solutions. Abner Brenner and Walter A. Olson. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions),* 1946, p. 29-31; discussion, p. 31-33.

Method involves precipitation of certain metallic impurities with potassium ferrocyanide.

8-68. X-Ray Diffraction Studies of Electrodeposits. Theodore Voyda. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions),* 1946, p. 33-48; discussion, p. 48.

Diffraction fundamentals; the application of the techniques to examination of lead-indium alloys, tin-copper and lead-tin alloy electrodeposits, nickel and copper flashes on steel, and silver flashes on copper to determine their significance in bonding silver to steel.

8-69. Corronizing Wire Screen Cloth Using Radiant Heating. J. Edward Bemiller and Damon C. Antel. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions),* 1946, p. 75-80; discussion, p. 80-81.

Process used by Hanover Wire Cloth Co., Hanover, Pa., for nickel plating of steel wire cloth.

8-70. Disposing of Plating Room Waste Liquors in Compliance With Stream Pollution Laws. C. J. Lewis. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions),* 1946, p. 81-90.

A general discussion.

8-71. Some Observations on Alkaline Electrotinning. T. G. Timby. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions),* 1946, p. 90-102; discussion, p. 116-117.

Most satisfactory techniques to be used in manufacture of tinplate. The effect of anode contour and design on anode current-density distribution. The effect of making the cathode narrower than the anode.

8-72. Electro Tin-Plating of Wide Steel Strip at High Speed. Samuel S. Johnston and Garold C. Jenison. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions),* 1946, p. 102-115; discussion, p. 116-117.

The development of commercial electrotinning processes. 18 ref.

8-73. Determination of Impurities in Electroplating Solutions. E. J. Serfass. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions),* 1946, p. 181-188.

Colorimetric procedures developed for lead, iron, manganese, chromium, silicon, and cadmium.

8-74. Methods for Testing Adhesion of Electrodeposits. A. L. Ferguson. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions)*, 1946, p. 188-199.

A.E.S. committee progress to date. A simple apparatus, depending on use of an adhesive between parts which are to be pulled by the tensile machine and the electrodeposit, is pictured. Various present methods.

8-75. Effect of Surface Finishing of Nonferrous Base Metals on Protective Value of Plated Coatings. Myron B. Diggin. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions)*, 1946, p. 206-209.

Research program to be conducted by A.E.S. committee. The effects of finishing procedures on the durability of electroplated coatings on copper-base alloys and on zinc-base die castings are to be evaluated. Deposits are to be limited to copper and bright nickel. Samples will be exposed to rural, industrial, and marine atmospheres, and to accelerated corrosion tests.

8-76. Polarization at Electrodes in Electroplating Processes. A. L. Ferguson. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions)*, 1946, p. 215-218.

The effects of polarization and overvoltage on the electroplating process.

8-77. Plating With the Acid Copper Sulphate Solution. George Schore. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions)*, 1946, p. 237-243; discussion, p. 243-244.

Rough copper deposits may be formed because of improper choice of plating conditions, imperfections in the cathode surface itself, or adhesion of electrically conductive particles to the cathode. Techniques for avoiding these deposits, and the need for further research.

8-78. A Periodic Chart for Electroplaters. George Dubpernell. *Proceedings of the American Electroplaters' Society (33rd Annual Technical Sessions)*, 1946, p. 244-257.

The discovery of the metallic elements which can be electrodeposited from aqueous solutions. A periodic chart is presented which appears useful for the correlation of information on the electrodeposition of metals. Generalities in connection with ease of deposition, electrode potential, physical properties, structure of deposits, current efficiency. 16 ref.

8-79. Plating Methods at Gerity-Michigan Plant. W. T. Walsh. *Products Finishing*, v. 11, May 1947, p. 28-30, 32, 34, 36, 38, 40, 42, 44.

Plating and materials-handling techniques at Gerity-Michigan Die Casting Co. plants in Detroit and Adrian, Mich.

8-80. Factors Affecting the Distribution of Electrodeposits. N. A. Tope. *Journal of Electrodepositors' Technical Society Preprint*, v. 22, 1947, p. 29-44.

Factors affecting primary current distribution; influence of surface condition; methods of modifying current distribution; effect of gas evolution; influence of specific conductivity of materials; influence of anode distribution; electrochemical factors; effect of metal ion concentration; factors affecting deposition potentials; use of strikes; effect of addition agents and contaminants; bright and alloy plating. 16 ref.

8-81. Discussions. *Journal of the Electrodepositors' Technical Society Preprint*, v. 21, 1946, p. 265-267.

Ten papers published by the Society during 1946 are discussed. They were concerned with: electrodeposition of speculum and of Sn-Zn alloys; determination of thickness of chromium deposits on nickel; electrogalvanizing of wire; electropolishing methods and applications; electroplating on aluminum; and plating solution defects and their remedies.

8-82. P.R. Plating—A New Tool for Electroplaters. George W. Jernstedt. *Westinghouse Engineer*, v. 7, May 1947, p. 89-92.

Periodic-reverse-current electroplating utilizes reversal of the plating current under specified optimum timing conditions. Photomicrographs show the superior quality of the plate obtained as compared with d.c. electroplating.

8-83. Practical Methods in Heavy Industrial Nickel Plating. E. J. Roehl. *Metal Finishing*, v. 45, May 1947, p. 56-59, 71.

Physical properties; cleaning; etching; adhesion; deposition rate; plating baths; antipitting agents; metal distribution control; machining; applications.

8-84. Metallography for the Electroplater. (Concluded.) Alex Blazy and J. B. Mohler. *Metal Finishing*, v. 45, May 1947, p. 68-71.

Techniques and procedures for the common metals and alloys.

8-85. Rectifiers for Electroplating. Part III. Louis W. Reinken. *Metal Finishing*, v. 45, May 1947, p. 72-74, 77.

Theory of parallel and series connections; variable voltages; parallel operation.

8-86. New Spray-Trapping Device. *Light Metals*, v. 10, May 1947, p. 232-233.

Polystyrene tubes, closed at each end to resemble miniature pillows, are floated on chromium-plating baths in

sufficient depth to blanket the bath and thereby lessen considerably the escape of fine spray.

8-87. Zinc Plating for Corrosion Resistance and Decorative Finishing. W. F. Coxon. *Metal Treatment*, v. 14, Spring 1947, p. 38-40.
Methods used and the future possibilities; the process is likely to prove a serious competitor of cadmium and nickel plating.

8-88. Chromic Acid. *Metal Industry*, v. 70, May 16, 1947, p. 365.
Suggestions for conserving this material in the plating industry.

8-89. Glass-to-Metal Seals. N. S. Freedman. *Metal Industry*, v. 70, May 23, 1947, p. 378-380.
A plating process for the electrodeposition of silver on steel which satisfactorily withstands the high-temperature processing encountered in the manufacture of electron tubes for high-frequency operation.

8-90. Bright Copper Plating. Harold Leever. *Die Castings*, v. 5, June 1947, p. 52, 54, 56.
New process for plating zinc die castings from copper cyanide solution.

8-91. Copper Plating in Alkanesulphonic Acid Baths. (Continued.) C. L. Faust, B. Agruss, E. L. Combs, and Wayne A. Proell. *Monthly Review*, v. 34, June 1947, p. 709-719.
Variables in copper alkanesulphonic acid, plating baths. Advantages and limitations. Bent-cathode tests for throwing power, copper-plate grain size, and anode behavior; a cell-voltage comparison between copper alkanesulphonic acid and copper fluoborate baths; an evaluation of the effect of iron and lead impurities; and results of a life test.

8-92. Overvoltage Required for Evolution of Hydrogen at High Current Densities. A. G. Pecherckaia and V. V. Stender *Journal of Applied Chemistry (U.S.S.R.)*, v. 19, no. 12, 1946, p. 1303-1312. (In Russian.)
Overvoltages necessary were determined for an extensive series of metals, at a series of current densities from 10^{-3} to 1.0 amp. per sq.cm. 26 ref.

8-93. Barrel Plated Multiple Coatings. Mario Mazzone and Floyd McKnight. *Metal Finishing*, v. 45, June 1947, p. 81-85.
Use of barrel plating of toy-train parts using copper, nickel, chromium, zinc, silver, and black oxidizing.

8-94. Rectifiers for Electroplating. Part III. Louis W. Reinken. *Metal Finishing*, v. 45, June 1947, p. 88-90.
Dual output rectifier unit; multi-output units: series-connected rectifiers for anodizing; and standard rectifiers in group operation. (Concluded.)

8-95. Electroplating Nonconductors. Thomas A. Dickinson. *Metal Finishing*, v. 45, June 1947, p. 95.
Copper, black-nickel, chromium, and gold plating of plastics or other nonmetallics.

8-96. Chrome Plating of Aluminum. A. R. MacPherson. *Light Metal Age*, v. 5, June 1947, p. 8-9.
Procedures for manufacture of chromium-plated aluminum household fixtures and accessories at Camp Manufacturing & Sales Co., Tacoma, Wash.

8-97. Electroplating. *Automobile Engineer*, v. 37, June 1947, p. 227-229.
The periodic reverse-current process.

8-98. The Control and Maintenance of Electroplating Solutions. Part III. P. Berger. *Sheet Metal Industries*, v. 24, June 1947, p. 1187-1195, 1201.
Chromium solutions. (To be continued.)

8-99. Plating of Die Castings. *Western Metals*, v. 5, June 1947, p. 34-36.
Plating processes with reference to the methods used at the Fisher-Ternstedt division of General Motors.

8-100. Electroplating. W. H. Safranek. *Metals Review*, v. 20, June 1947, p. 7-8, 47.
New developments in special-purpose chromium plates, electroplating of bearings, electroforming, plating aluminum alloys, decorative and protective plates reported in the literature for the past year.

8-101. Automatic Conveyers for Electroplating. Adolph Bregman. *Iron Age*, v. 159, June 19, 1947, p. 68-74.
Design, selection, and operating characteristics of automatic conveyers for electroplating equipment. The development of automatic units, major types of machines available and where each type may be most effectively used.

8-102. Plating Smallwares. Parts I and II. R. MacNair. *Metal Industry*, v. 70, June 6, 1947, p. 423-425; June 20, 1947, p. 464-466.
The finishing of small articles by barrel polishing and barrel plating. The type of equipment available, the abrasive media used, the preparation of the work, methods of scale removal, and the barrel polishing of cast iron, mild steel, bright steel articles, and small brass die-castings.

8-103. Automatic Conveyers for Electroplating. Adolph Bregman. *Iron Age*, v. 159, June 26, 1947, p. 58-64.
Advantages and limitations of automatic electroplating equipment. Plating costs with full automatic conveyers; operating characteristics of a number of automatic conveyers available for plating work.

8-104. Engineering Electroforming. M. H. Orbaugh. *Monthly Review,* v. 34, July 1947, p. 810-815.

History, techniques, applications, materials, and allied processes (selective deposition for building up worn or improperly machined parts, and metal coating of nonconductors).

8-105. Porosity of Electrodeposited Metals. Part III. Critical Literature Review. N. Thon and E. T. Addison, Jr. *Monthly Review,* v. 34, July 1947, p. 831-842.

Methods of determination of total porosity; correlation between porosity and corrosion-exposure tests; results and conclusions of porosity investigations; causes and nature of porosity. (To be continued.)

8-106. Finishing of Zinc-Base Die-Castings. Parts I and II. C. F. Nixon. *American Machinist,* v. 91, July 3, 1947, p. 149, 151.

From paper presented before the American Electroplaters' Society.

8-107. Bright Zinc Plating Cuts Costs at Philco Plant. Clarence W. Smith. *Iron Age,* v. 160, July 10, 1947, p. 46-49.

Use of bright zinc plating on sheet-metal radio and television-set parts, in place of cadmium, has resulted in savings of $100,000 per year at the Philco Corp. Philadelphia plant. Equipment and procedures used in applying this finish rapidly and efficiently.

8-108. Metal Distribution From a Plating Bath. J. B. Mohler and H. J. Sedusky. *Iron Age,* v. 160, July 17, 1947, p. 56-59, 144.

Some of the basic aspects of metal distribution and the factors affecting current distribution, throwing and covering power, polarization, plating range, and current density, particularly as they influence plating quality.

8-109. Engineering a Small Job-Plating Shop. A. Lakos. *Metal Finishing,* v. 45, July 1947, p. 69-70, 89.

Useful hints on promoting efficiency in a small shop.

8-110. Largest Automatic Plating Plant in the World. *Metal Finishing,* v. 45, July 1947, p. 67-68.

Fully automatic plant of an automobile manufacturer.

8-111. Metal Surfacing by Hard Chromium Plating. Edwin H. Halvorsen. *Metal Finishing,* v. 45, July 1947, p. 71-76.

Decorative and hard chromium plating; cemented tungsten carbide; stellite; tantalum and titanium carbide tools; and chromium-plated high speed steel tools. Plated molybdenum high speed steel, gear-shaper cutters show increased tool life.

8-112. Industrial Plating of Zinc-Base Die Castings. Charles Temple. *Metal Finishing,* v. 45, July 1947, p. 82-83.

Methods and equipment used by Globe Slicing Machine Co., Stanford, Conn.

8-113. Les Tendances Actuelles de la Technique des Dépots Electrolytiques. (Present Trends in the Technique of Electrolytic Deposits.) M. A. Glazunov. *Revue de Metallurgie,* v. 43, July-Aug. 1946, p. 214-218.

Desirable qualities in electrolytic deposits and methods of producing satisfactory ones.

8-114. Influence of Surface-Active Organic Compounds on the Kinetics of the Cathodic Deposition of Tin. M. Loshkarev, V. Sotnikova, and A. Krinkova. *Journal of Physical Chemistry (U.S.S.R.),* v. 21, no. 2, 1947, p. 219-229. (In Russian.)

Influence of a series of additives on the kinetics of cathodic deposition of tin from sulphuric acid solution. The addition of slight amounts of alpha and beta-naphthols, xylenols, thymol, diphenylamine, or tribenzylamine results in polarization which increases with simultaneous addition of colloidal substances. 18 ref.

8-115. Inspection of Exposure Test Panels With Non-Decorative, Electrodeposited, Cathodic Coatings. H. A. Pray. *American Society for Testing Materials Preprint 39,* 1947, 4 p.

The function of cathodic, electrodeposited metallic coatings used for purely protective purposes and the way in which they deteriorate on weathering. Rating systems are summarized, with particular emphasis on the methods used for the exposure tests of electrodeposited lead coatings on steel.

8-116. Rating Exposure Test Panels of Decorative Electrodeposited Cathodic Coatings. W. A. Wesley. *American Society for Testing Materials Preprint 38,* 1947, 12 p.

Rating methods and a set of numerical reference standards developed for use in recent cooperative tests.

8-117. Roval Dichrome Process. *Engineering Materials,* v. 5, June 1947, p. 58.

New British process for surface treatment of zinc-base die castings prior to chromium plating. The use of this process eliminates the necessity for an intermediate metal layer.

8-118. Bright Copper Plating. *Canadian Metals & Metallurgical Industries,* v. 10, July 1947, p. 23.

Process developed by MacDermid Bros., Waterbury, Conn.

8-119. Procedures for High Volume Quality Plating. Jack Hasten. *Die Castings,* v. 5, Aug. 1947, p. 55-58.

Methods and equipment used in the plating of zinc-alloy die castings at C. M. Hall Lamp Co., Detroit, manufacturers of automotive lighting equipment.

8-120. New Pontiac Plating Plant. *Monthly Review,* v. 34, Aug. 1947, p. 956-958.

Describes and illustrates new General Motors plant.

8-121. Surface Texture Study of Electroplated Zinc. R. I. Lunt. *Metal Finishing,* v. 45, Aug. 1947, p. 68-70, 72.

A photomicrographic study of electroplated surface textures. The factors which influence surface texture and smoothness on strip and sheet steel. The work represents an investigation of zinc and zinc-alloy plating from acid baths.

8-122. Toxicity of Chemicals in Electroplating. P. M. Van Arsdell. *Metal Finishing,* v. 45, Aug. 1947, p. 55-60, 67.

Toxic reactions to the following metals and metallic salts: aluminum and its salts; ammonium hydroxide and ammonium salts; antimony and its salts; arsenic; boron compounds; cadmium and its salts; and chromium and compounds used in plating.

8-123. Corrosion Resistant Cements in the Plating Room. Vincent A. Curil. *Corrosion and Material Protection,* v. 4, July-Aug. 1947, p. 19-20.

The major problems of many plating rooms is the handling of corrosive solutions to prevent pitting and erosion of floors, destructive attack in drains and developments of leaks with resulting loss of solution from pickling and plating tanks. How they can be overcome and why they are important in electroplating operations.

8-124. World's Largest Plating Plant Eliminates All Manual Handling. Anders Jansson. *Tool Engineer,* v. 19, Aug. 1947, p. 29-30.

How automatic processing steps up production.

8-125. Chevrolet Increases Nickel Plating on Bumpers. Larry Strong and H. F. Reves. *Products Finishing,* v. 11, Aug. 1947, p. 20-22, 24, 26.

Equipment and procedures in electroplating department of forge, spring, and bumper division. Minimum thickness of plate is now triple that of recent specifications.

8-126. Electrometallurgy Devoted to the Electrodeposition of Metals. E. R. Thews. *Metal Industry,* v. 71, Aug. 1, 1947, p. 91-92.

The use of insoluble and cast anodes, the anode shape and characteristics, and the degree of solubility.

8-127. Elektroplatering i Teori och Praktik. (Electroplating in Theory and Practice.) Part II. *Finish (Sweden),* v 4, April 1947, p. 75-78.

Electroplating practices and theory in countries outside of Sweden.

8-128. Treatment Works for Plating Wastes Containing Toxic Metals and Cyanides. George E. Barnes. *Water & Sewage Works,* v. 94, Aug 1947, p. 267-271.

Processes and plants for treating the plating wastes from Talon, Inc. Starting with simple provision for neutralizing the spent pickling liquors with lime, improvements were begun to remove cyanides and chromium along with other toxic metals such as copper and nickel. A new multipurpose treatment works for complete treatment of all the wastes.

8-129. Periodic Reverse Current Electroplating. George W. Jernstedt. *Steel Processing,* v. 33, Aug. 1947, p. 479-482, 498.

Polishing costs are reduced and the plated deposit shows superior qualities of strength, elasticity, density, and freedom from flaws such as porosity.

8-130. Filtration of Electroplating Solutions. S. Alsop, Jr. *Asbestos,* v. 29, Aug. 1947, p. 4, 6, 8.

The introduction of bright finishes, automatic plating machines, high speed processes and higher current densities, to deposit more metal faster during the plating process, makes filtering an important consideration. Plating plants are now using asbestos filter pads to remove the sludge which is formed by the dissolving of the electrodes, plus solids thrown out of solution in the water and plating chemicals, in addition to dust, dirt, and oil from the surrounding air, and contamination from the products to be plated.

8-131. Electroless Plating on Metals by Chemical Reduction. *Chemical Age,* v. 57, Aug. 2, 1947, p. 156-157. Also *Western Metals,* v. 5, Aug. 1947, p. 38-39.

A new method for plating nickel and cobalt on metal surfaces without the use of electric current, known as electroless plating, and brought about by chemical reduction of a nickel or cobalt salt with hypophosphite in hot solution. The process was developed by Abner Brenner and Grace E. Riddell of the U. S. National Bureau of Standards. The reaction is catalytic, and under the prescribed conditions of concentration and pH, no plating occurs unless certain metals, such as steel or nickel, are introduced in the bath.

8-132. Automatic Electroplating Line. A. H. Allen. *Steel,* v. 121, Aug. 25, 1947, p. 80-83, 126, 128.

One of the largest and most completely automatic copper-nickel-chromium electroplating installations in the world is now in operation at the plant of Pontiac Motor Division.

8-133. Blistering of Cadmium Plate on Soldered Steel. E. R. Bowerman. *Monthly Review,* v. 34, Sept. 1947, p. 1026-1032.

Blistering of electrodeposited coatings has generally been attributed to faulty plating techniques, but type of blistering described is due to alloy formation between the electrodeposited metal and the base metal.

8-134. Anodes—II. Cast, Rolled, Electrodeposited and Extruded Copper. E. R. Thews. *Metal Industry,* v. 71, Aug. 15, 1947, p. 126-128.

Production, choice, and uses.

8-135. Introduction to the Electrochemistry of Protective Films. G. V. Akimov. *Progress in Chemistry (U.S.S.R.),* v. 16, May-June 1947, p. 353-363. (In Russian.)

Electrodeposited metallic films on metal. 12 ref.

8-136. Electroplated Tin Coatings. *Canadian Metals & Metallurgical Industries,* v. 10, Aug. 1947, p. 20.

A process known as Speculum plating developed by the British Tin Research Institute.

8-137. Plating Practice at Ternstedt. *Die Castings,* v. 5, Sept. 1947, p. 58, 60, 62-64.

Buffing, cleaning, plating, and stripping of zinc-base die castings.

8-138. Practical Applications of Modern Products. *Products Finishing,* v. 11, Sept. 1947, p. 88, 90, 92, 94, 96.

Automobile hardware plating plant produces 1½ acres of plating every 8-hr. shift. Electropolishing process for stainless steel at American Rolling Mill Co. Washing machine manufacturer gains precision with power brushing.

8-139. Electroplating; Modern Uses in the Engineering Industry. W. F. Coxon. *Metal Industry,* v. 71, Aug. 29, 1947, p. 170-172.

Electroforming applications; use of porous chromium on piston rings; plating control; machinable hard chromium; journal repair; electroplated bearings.

8-140. Practical Copper Reduction on Nonconductors. Harold Narcus. *Metal Finishing,* v. 45, Sept. 1947, p. 64-67, 70.

New method to be used prior to application of metallic coatings. Reduction takes place by treatment with Fehling's solution and a metallo-organic derivative of sodium hydrosulphite. The commercial adaptability of this process for plating on plastics; advantages over the usual silver nitrate method. 12 ref.

8-141. High Production Job-Shop Plating. Louis J. Donroe. *Metal Finishing,* v. 45, Sept. 1947, p. 71-74.

Surface preparation procedures on full automatic and semi-automatic plating equipment in one of the largest job-shop plating plants in the country.

8-142. Rectifiers for Electroplating—Part IV. Louis W. Reinken. *Metal Finishing,* v. 45, Sept. 1947, p. 75-78.

Circuits for on-off control; protection; meters.

8-143. Toxicity of Chemicals in Electroplating. (Continued.) P. M. Van Arsdell. *Metal Finishing,* v. 45, Sept. 1947, p. 79-83.

Chromates; cobalt compounds; copper and copper salts; gold compounds; iron and the ferric salts; lead and lead salts; mercuric salts; nickel and nickel salts; rhodium; platinum; palladium. (To be continued.)

8-144. The Control and Maintenance of Electroplating Solutions. Part IV. (Concluded.) P. Berger. *Sheet Metal Industries,* v. 24, Sept. 1947, p. 1820-1824.

Cadmium and zinc solutions of the cyanide type, and tin solutions.

8-145. A Comparison of British and Spanish Practice in the Chromium Facing of Press Dies. Juan B. Vericat Raga and Joaquín Agulló Marly. *Sheet Metal Industries,* v. 24, Sept. 1947, p. 1829-1833; discussion, p. 1833-1835, 1839.

Two Spanish technicians make a critical analysis of "Chromium Facing Press Dies", by E. A. Ollard and E. B. Smith, which appeared in the June issue. Authors' reply. (Reprinted from *Técnica Metalúrgica.*)

8-146. Plating Quality Studied. *Iron Age,* v. 160, Sept. 25, 1947, p. 81-82, 136-137.

A series of reports on various problems of the electroplater. Buffability of nickel deposits; porosity; analysis of plating baths; effect of copper in nickel solutions. (Papers presented at the 1947 annual convention of the American Electroplaters' Society.)

8-147. The Application of the Spekker Photo-Electric Absorptiometer to the Analysis of Chromium Plating Solutions. W. J. Bayley. *Journal of the Electrodepositors' Technical Society,* v. 22, 1947, p. 121-128. (Reprint.)

Methods for the rapid determination of trivalent and hexavalent chromium and iron using the above instrument.

8-148. The Design and Use of a Photoelectric Absorptiometer for the Analysis of Solutions Employed for the Electrodeposition of Hard Chromium. H. E. Styles. *Journal of the Electrodepositors' Technical Society,* v. 22, 1947, p. 129-154. (Reprint.)

Changes in chemical composition resulting from the use of chromic acid solution for electrodeposition. Causes

of such changes, effects, and methods whereby the solution composition may be maintained within satisfactory working limits. A photo-electric absorptiometer which is particularly suitable for turbidimetric measurements; details for the absorptiometric estimation of the sulphate, chromium contents of plating solutions. Barium chloride as a reagent for sulphate ion; an absorptiometric method for estimating small concentrations of sulphate in water.

8-149. A Review of F.I.A.T. Final Report No. 879: The Peeling of Nickel Deposits. *Chemical Age,* v. 57, Sept. 6, 1947, p. 330, 332.

The causes of peeling of electrodeposited nickel coatings and the various means of correcting.

8-150. Anodes. Part III—Cast and Rolled 70-30 and 80-20 Brass. E. R. Thews. *Metal Industry,* v. 71, Sept. 12, 1947, p. 225-226.

Physical state of brass anodes, the effect of zinc content, and methods of fault determination.

8-151. Mechanical Properties of Nickel Deposits. E. J. Roehl. *Monthly Review,* v. 34, Oct. 1947, p. 1129-1140.

Experimental data for electrodeposits produced from an all-chloride bath and a typical Watts bath. Effects of pH, solution temperature, current density, and annealing temperature and time, on hardness, ductility, and tensile strength.

8-152. Anodizing—What It Is and How It's Done. Rick Mansell. *Canadian Metals & Metallurgical Industries,* v. 10, Sept. 1947, p. 23, 25-26.

8-153. Plated Zinc-Base Die Castings. E. J. Roehl. *Metal Finishing,* v. 45, Oct. 1947, p. 63-67.

A résumé of modern methods for plating zinc-base die castings.

8-154. Electroplating Control Laboratory. (Concluded.) H J Sedusky and J. B. Mohler. *Metal Finishing,* v. 45, Oct. 1947, p. 68-71, 74.

Determination of surface tension and conductivity; colorimetry; polarography; instrument selection; tanks; temperature and liquid-level control; chemicals; tools; electrolytic analyses; small-scale plating.

8-155. Fluid Mechanics: Forgotten Factor in Electroplating. Joseph B. Kushner. *Metal Finishing,* v. 45, Oct. 1947, p. 72-74.

Importance of fluid mechanics to the electroplater, fundamental principles, and necessity for research along these lines.

8-156. Toxicity of Chemicals in Electroplating. (Concluded.) P. M. Van Arsdell. *Metal Finishing,* v. 45, Oct. 1947, p. 75-81.

Silver and its salts; tin and its salts; zinc and its salts; acids; alkalies; cyanides; sulphides; sulphates; oxalic acid; hydrogen fluoride; the fluosilicates and fluoborates; and neutral solutions. Toxic reactions and first-aid procedures.

8-157. Anodes—IV. Operating Factors Involved in the Utilization of Gold. V. Zinc—Cadmium—Tin—Lead. E. R. Thews. *Metal Industry,* v. 71, Sept. 26, 1947, p. 268-269; Oct. 10, 1947, p. 307-309.

The utilization of gold anodes for practical plating purposes. The elimination of the excessive solubility of pure zinc anodes and the effect of alloying additions to cadmium anodes. Tin and lead anodes also mentioned briefly.

8-158. A Semi-Quantitative Method for Measuring the Ductility of Chromium Electrodeposits. M. R. J. Wyllie. *Electrochemical Society Preprint 92-5,* 1947, 17 p.

The Dubpernell test was adapted for assessing quantitatively both initial porosity and cracking of chromium plate after elongation. Under the conditions used, porosity always takes the form of small circular holes in the deposits. Relationships of porosity and cracking and the effect of electroplating bath temperatures and other factors on these phenomena.

8-159. Electrolytic Reduction of Acetone to Pinacol. O. C. Slotterbeck. *Electrochemical Society Preprint 92-10,* 1947, 12 p.

A continuous process. These cathodes are easily prepared by electrodepositing a relatively thin film of lead on a copper surface. Studies made of various other types of cathodes indicate that zirconium-plated copper is the only one that shows any promise. 12 ref.

8-160. Electrolized Tools. *Western Machinery and Steel World,* v. 38, Oct. 1947, p. 91.

New process for prolonging the life of cutting tools is now being applied to drills, reamers, end mills, keyway cutters, and center drills as well as other kindred cutting tools. The basic principle is the deposition of 0.000002 in. of an unusually hard alloy, so applied that, in effect, there is no internal or external change in the dimensional accuracy of the tools processed. Details are not given.

8-161. Plating Bath Voltage. G. W. Croninger and J. B. Mohler. *Iron Age,* v. 160, Oct. 30, 1947, p. 66-68.

Resistivity data for a number of common plating baths and an explanation of the use of these data for

calculating plating bath voltage, particularly useful when using high current density baths. Such data also indicate changes in conditions that will reduce the required voltage.

8-162. Sources of Impurities in Electroplating Solutions. Myron B. Diggin. *Monthly Review,* v. 34, Nov. 1947, p. 1236-1242.

The various types; inorganic impurities in solution; organic impurities in solution; solid and dispersed impurities; gaseous impurities.

8-163. Continuous Electrolytic Solution Purification. C. E. Heusser and L. M. Morse. *Monthly Review,* v. 34, Nov. 1947, p. 1243-1249.

Principles of such a method developed for use in the plants supplying Chrysler Corp. 10 ref.

8-164. Features of the Slot Plating Range Cell. J. B. Mohler. *Steel,* v. 121, Nov. 3, 1947, p. 92, 118

Test cell designed to determine the range of effective current densities. A slot in front of the actual anode controls the distribution of current over the cathode. The latter is inclined in such a way that the current density along its length decreases exponentially as the distance from the slot increases. The slot anode is not subject to changes in concentration and polarization that take place at a real anode.

8-165. Coordination Compounds in the Electrodeposition of Chromium. R. W. Parray, Sherlock Swann, Jr., and John C. Bailar, Jr. *Electrochemical Society Preprint 92-27,* 1947, 12 p.

Plating of chromium from solutions of aqua and other complexes. Chromic sulphate solutions are superior to chloride solutions as plating baths; plates could not be obtained at all from solutions of chromic nitrate or perchlorate No difference in plating behavior between the green and violet forms of chromic chloride was observed. 31 ref.

8-166. Der Einfluss der Hartverchromung auf die Dauerfestigkeit von Aluminiumlegierungen. (The Influence of Hard Chromium Plating on the Fatigue Strength of Aluminum Alloys.) Ernst Raub. *Metallforschung,* v. 2, April 1947, p 121-126.

The fatigue strength of pressed bars of Al-Mg and Al-Mg-Zn alloys, as affected by different surface treatments (including hard chromium plating). The influence of various thicknesses of chromium and of crystal structure on fatigue strength.

8-167. L'Isolement des Conducteurs en Aluminium par Oxydation Anodique. (Insulation of Aluminum Conductors by Anodic Oxidation.) Jean Odier. *Revue de l'Aluminium,* v. 24, Sept. 1947, p. 259-264.

Equipment used to produce flexible conductors (wires and ribbons) which are coated with a layer of aluminum having high dielectric strength. Properties of some commercial wires are given.

8-168. Machine Designed for High-Speed Metal Plating. A. D. Canner, C. Twele, and T. J. Connor. *Materials & Methods,* v. 26, Nov. 1947, p. 79-82.

Unit developed by General Electric eliminates use of large tanks, acids, and motor-generator sets. The entire process takes place in a piece of equipment 5 ft. wide, 4 ft. deep, and 5 ft. high, with service connections for 440-volt a.c. current, 100-lb. air, 50-lb. water, and a liquid drain outlet.

8-169. Electroplating on Aluminum. (Preparation by Zinc Immersion Process.) Myron B. Diggin. *Metal Finishing,* v. 45, Nov. 1947, p. 67-69.

Recipes for surface preparation of the different types of alloys, and for plating with copper, nickel, cadmium, zinc, brass, silver, and chromium.

8-170. Introductory Survey of Electroplating. Rick Mansell. *Metal Finishing,* v. 45, Nov. 1947, p. 70-74.

Basic principles; function of coatings; corrosion protection; electroplating factors; coating properties; bath characteristics; and solution components.

8-171. The Structure of Hard Chromium Deposits on Steel. H. J. Goldschmidt. *Metallurgia,* v. 36, Oct. 1947, p. 297-302.

Investigation by X-ray analysis shows that the base metal plays a vital part and that the structure of the interface between it and the deposit largely decides the properties of the plating. Structural changes on annealing at temperatures up to 1000° C. Three classes of occluded hydrogen are distinguished, according to the firmness of binding in the lattice. The effect of external friction on the plating structure is essentially different in the poor and good quality types. 17 ref.

8-172. Electrodeposition of Tungsten Alloys Containing Iron, Nickel, and Cobalt. Abner Brenner, Polly Burkhead, and Emma Seegmiller. *Journal of Research of the National Bureau of Standards,* v. 39, Oct. 1947, p. 351-383.

Deposits are smooth, strong, and brittle. The nickel and cobalt alloys become ductile on heating. As plated, the nickel and cobalt alloys have a hardness of 350 to 700 Vickers, and the iron alloy, 700 to 900 Vickers. The alloys undergo precipitation hardening and the cobalt-tungsten alloys retain their hardness when hot. 27 ref.

8-173. Anodes, Part VI. Operating Factors Involved in the Utilization of Chromium. E. R. Thews. *Metal Industry,* v. 71, Oct. 24, 1947, p. 343-344.

See item 8-157.

8-174. Copper Plating; Cyanide-Free Electrolyte for Coppering Steel. A. Levin. *Electroplating,* v. 1, Nov. 1947, p. 25-27.

A laboratory investigation of copper sulphate-oxalate baths with and without organic addition agents. Alkaline copper sulphate-ammonium oxalate electrolytes appear to possess some interesting possibilities. (Translated and condensed from *Journal of Practical Chemistry (U.S.S.R.),* v. 14, no. 1, 1941, p. 74-78.)

8-175. Rapid Plating Range Test. J. B. Mohler. *Iron Age,* v. 160, Dec. 4, 1947, p. 75-76.

Plating range test is designed to enable platers to maintain the plating range for chromic acid baths at a maximum without requiring continual chemical analyses. It may also be effectively applied to chromate baths using catalysts other than sulphuric acid.

8-176. Tungsten Alloy Electrodeposition. *Iron Age,* v. 160, Dec. 4, 1947, p. 70.

New method recently reported by the National Bureau of Standards.

8-177. Anodic Reactions of Aluminum and Its Alloys in Sulphuric and Oxalic Acid Electrolytes. Ralph B. Mason and Charles J. Slunder. *Industrial and Engineering Chemistry,* v. 39, Dec. 1947, p. 1602-1607.

Factors which affect the formation of aluminum oxide produced by the anodic treatment of aluminum in sulphuric and oxalic acid electrolytes. Purity of the aluminum anode has a marked effect upon the efficiency of oxide coating formation, the highest efficiency being obtained with pure aluminum.

8-178. Fatigue Limit of Chromium-Plated Steel. Louis Mehr, T. T. Oberg, and J. Teres. *Monthly Review,* v. 34, Dec. 1947, p. 1345-1359.

A systematic study of the effects of different variables on the fatigue limit. Attempts to develop a process which would cause such a low fatigue loss that the necessity for testing each plated part could be dispensed with. It was concluded that chromium plate cannot be applied indiscriminately to highly stressed areas subject to vibration. Each application to aircraft parts should undergo a test with a sufficient number of cycles to determine serviceability.

8-179. Laboratory Apparatus for Controlled Current Distribution on Small, Flat Specimens. J. B. Mohler and R. A. Schaffer. *Monthly Review,* v. 34, Dec. 1947, p. 1361-1364.

Apparatus using the principle of insulating boundaries in electroplating. Insulating walls between the anode and the cathode can be conveniently substituted for apparent distance which equalizes the current density on all points of the cathode or can be used to obtain a uniformly varying current density.

8-180. The Influence of the Basis Metal in Electroplating. R. Piontelli. *Sheet Metal Industries,* v. 24, Dec. 1947, p. 2399-2404, 2416.

Experiments on the deposition of lead on various cathodes showed that, for a given current density, the number of "centers of crystallization" varied considerably with the nature and surface condition of the base metal. The importance of surface irregularities in creating local conditions favorable to the formation of nuclei. Possible mechanisms of electrodeposition in the light of fundamental lattice considerations. 18 ref. (Presented at recent International Conference on Electrodeposition.)

8-181. Plating of Die Castings Including Buffing, Cleaning, Plating and Stripping. C. F. Nixon. *Products Finishing,* v. 12, Dec. 1947, p. 42, 44, 46, 48, 50, 52, 54, 56, 58.

Plated die castings for the Fisher Body and automotive divisions of General Motors. (A paper presented to the American Electroplaters' Society.)

8-182. Alloys by Electrodeposition. J. B. Mohler and H. J. Sedusky. *Metal Finishing,* v. 45, Dec. 1947, p. 65-70.

Practical points which must be considered in development of new plating baths for deposition of alloys. Properties of some well-known electrodeposited alloys and future prospects. 20 ref.

8-183. Introductory Survey of Electroplating. (Concluded.) Rick Mansell. *Metal Finishing,* v. 45, Dec. 1947, p. 79-81.

General plating practice—racks, tanks, and electrical equipment.

8-184. Tanks and Linings for Electroplating. *Metal Finishing,* v. 45, Dec. 1947, p. 91.

8-185. Common Plating Bath Troubles—Their Causes and Cures. J. B. Mohler. *Iron Age,* v. 160, Dec. 11, 1947, p. 98-101, 170.

Rough, burnt, off-color, peeled, brittle, cracked, blistered, spotty, and pitted deposits are diagnosed and cures suggested. Testing and control methods, both general and specific; a continuous purification system.

8-186. Electrodeposition of Tungsten Alloys on Metal Surfaces. *Steel,* v. 121, Dec. 29, 1947, p. 63, 66.

Process developed at National Bureau of Standards.

8-187. Smoothing Action as a Mechanism in Bright Nickel Plating. G. E. Gardam. *Journal of Electrodepositors Technical Society Reprint,* v. 22, 1947, p. 155-168.

Electrodeposits of nickel from solutions containing zinc, cadmium, or iron, made on a serrated cathode, were thicker in the hollows than on the crests. Nickel plating solutions which yield bright deposits have been shown by reflectivity test deposits on slightly mat surfaces to produce a similar smoothing action but on a smaller scale. Theoretical and practical importance of this phenomenon.

8-188. Part I. Standard Threshold Tests. Part II. Program for Establishing the "Bent Cathode Test" as a Means of Determining Impurities in Nickel Plating Baths. William L. Grube. *U. S. Atomic Energy Commission MDDC-1118,* Sept. 29, 1944, 24 p.

In evaluation of electrolytes for a specific requirement, it is desirable to determine whether the solution exhibits selective attack on either nickel or copper. An electrolyte which dissolves either of the metals and leaves the other comparatively unattacked possesses the desired properties. A test which furnishes this information and gives results obtained from its application to several electrolytes. Also included is a tentative program for the development of a standard bent cathode test for the control of impurities in electrolytes for plating nickel.

8-189. Electroforming; Practical Details of Available Methods. A. H. Stuart. *Electroplating,* v. 1, Dec. 1947, p. 45-48, 70.

8-190. Metallography of Electro-Deposited Surfaces. A. T. Steer. *Electroplating,* v. 1, Nov. 1947, p. 5-15, 28; Dec. 1947, p. 49-53.

Method of preparation and examination of specimens for defects. Details of application of the technique to an actual specimen. (To be continued.)

8-191. Measurement of Embrittlement During Chromium and Cadmium Electroplating and the Nature of Recovery of Plated Articles. Carl A. Zapffe and M. Eleanor Haslem. *Transactions of American Society for Metals,* v. 39, 1947, p. 241-258; discussion, p. 258-260.

Previously annotated in R.M.L., v. 3, 1946, item 8-128.

8-192. Report of Committee B-8 on Electrodeposited Metallic Coatings. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 265-267.

Tabulated summary of inspection data on results of atmospheric exposure tests on various types of the above coatings. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

8-193. The Electrodeposition of Copper; A Review of Recent Literature. Herbert Bandes. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 263-278; discussion, p. 278-279.

Previously annotated in R.M.L., v. 3, 1946.

8-194. The Electrodeposition of Nickel-Cobalt-Tungsten Alloys From an Acid Plating Bath. Paul F. Hoglund and M. L. Holt. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 359-369; discussion, p. 369.

12 references.

8-195. The Electrodeposition of Metals on Plastics. Harold Narcus. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 371-387; discussion, p. 387-391.

Previously annotated in R.M.L., v. 2, 1945.

8-196. Electrolytic Analysis of Strike Solutions. R. A. Schaefer and J. B. Mohler. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 421-431.

Previously annotated in R.M.L., v. 3, 1946.

SECTION IX

PHYSICAL AND MECHANICAL TESTING

9-1. Some Unusual Tests of Cast Iron. Part I. James S. Vanick. *Foundry,* v. 75, Jan. 1947, p. 66-71.

A number of nonstandard methods used to obtain special information. Test pieces and equipment illustrated. This installment covers bending tests; compression tests; tensile testing; elasticity and deformation testing; tortion testing. (To be concluded.)

9-2. Influence of the Duration of Test on the Strength Value of Materials. T. A. Kontorova. *Reports of the Academy of Sciences of U.S.S.R.,* v. 54, no. 1, 1946, p. 23-26. (In Russian.)

Dependence of strength of material on the duration of the test is a form of fatigue. Use of an altered Maxwell equation for the determination of this dependence proposed.

9-3. The Effects of Notching Under Axial and Eccentric Loads. Georges Welter. *Metallurgia,* v. 35, Nov. 1946, p. 33-36.

Results of tests made on construction materials in order to establish a classification with respect to ductility of light metals and alloys in comparison with other heavy structural materials. Standard and special notched specimens were tested under axial and eccentric loads producing single tension as well as combined tension and bending stresses.

9-4. Plastic Flow, Creep, and Stress Relaxation. Charles Mack. *Journal of Applied Physics,* v. 17, Dec. 1946, p. 1086-1107.

A theoretical treatment in three parts. In Part I, it is shown that product of strain rate and viscosity is equal to the sum of the differences between applied stress and yield values. This relationship is applied to plastic flow. Equations are given for coefficient of viscosity of such systems and for relaxation of stress at constant deformation as a function of time. In Part II, the general equation in Part I is applied to creep. Equations are derived which give stress as a function of strain rate and strain, and as a function of strain rate, strain, and time. In Part III, equations given in connection with plastic flow, creep due to workhardening, thixotropy, and creep in combination with elastic aftereffect are applied to literature data. These equations describe the deformation and relaxation mechanisms of a wide variety of materials. 40 ref.

9-5. New Design of Elastic Proving Bar. C. G. Lutts and Dante Cuozzo. *ASTM Bulletin,* Oct. 1946, p. 41-42.

New design of elastic proving bar whereby elongation is measured centrally along the axis, thus automatically giving average elongation with a single reading. Preliminary calibration data to a load of 200,000 psi.

9-6. Correlated Brittle Fracture Studies of Notched Bars and Simple Structures. C. W. MacGregor, N. Grossman, and P. R. Shepler *Welding Journal,* v. 26, Jan. 1947, p. 50s-56s.

A preliminary step in correlating the action of notched bars and various types of structures to obtain data of direct use to designers. A thin circular disk, freely supported along its circumference and bent by a centrally applied load was studied. A notched bar in simple bending was found to have identical transition temperatures at the same deflection velocities as the circular disk. The same approach is believed applicable to the study of brittle temperature characteristics of more complicated structures. 12 ref.

9-7. Effect of Iron and Silicon Impurities on the Tensile Properties and Heat Treatment Characteristics of Sand-Cast Aluminum 10% Magnesium Alloy Test Bars. R. T. Parker, G. M. L. Cox, and A. N. Turner. *Journal of the Institute of Metals,* v. 73, Dec. 1946, p. 175-196.

To explain the differences between melts, groups of D.T.D. test bars were cast in dry sand from melts containing 0.10 to 0.75% iron with 0.10 to

0.50% silicon. While an increase of iron has a slightly beneficial effect, an increase of silicon drastically reduces the ultimate tensile strength and elongation. Proof stress value is slightly increased with increasing total impurity content. Comparison of low and high-purity aluminum, 10% magnesium, alloy test bars under varying heat treatment conditions showed that the high-purity alloy is much more sensitive to differences in solution time and temperature.

9-8. The Falling Sand Abrasion Tester. C. C. Hipkins and R. J. Phair. *ASTM Bulletin,* Dec. 1946, p. 18-22.

The results obtained in a series of tests conducted by the Technical Committee of Protective and Technical Coatings, Chemical Division, War Production Board; some of the variables encountered. Reproducibility is possible with a simple construction and procedure which may be considered as a basis for standardization.

9-9. A New Sandpaper Abrasion Tester. F. M. Gavan, S. W. Eby, Jr. and C. C. Schrader. *ASTM Bulletin,* Dec. 1946, p. 23-29.

An abrasion machine employing a continuously changing abrasive surface has been in use since 1941 in testing various flooring materials, synthetic resins, substitute rubber compounds, metals and painted surfaces. Standard comparison specimens of zinc are tested with each run. Measurements taken on these standards over a period of years have shown the method to be reasonably consistent.

9-10. A Method for Predicting Failure of Metals. P. E. Cavanagh. *ASTM Bulletin,* Dec. 1946, p. 30-33; discussion, p. 33-35.

Possibilities of using changes in high-frequency magnetic and eddy-current losses to predict failure in metals. Method of recording changes in total magnetic and eddy-current losses (or "core losses"); examples of stress-core loss curves obtained.

9-11. Pneumatic Fatigue Testing. F. B. Quinlan. *Automotive and Aviation Industries,* v. 96, Jan. 15, 1947, p. 30-31, 94, 96.

Design features of a pneumatic testing machine which will fatigue test, in reversed bending, the turbine buckets used in turbosuperchargers and jet engines.

9-12. Eenige Beschouwingen Over Trekkrommen. (Some Considerations Concerning Tensile Testing.) J. H. Palm. *Metalen,* v. 1, Dec. 1946, p. 55-61; Jan. 1947, p. 85-88.

Diagrams in which true stress is plotted against degree of deformation are more suitable for comparison and evaluation of metals than the load-elongation diagrams obtained from tensile testing machines. Diagrams in which conventional strain, local strain, and reduction of neck cross-section are used as a measure of degree of deformation. Mathematical relationships between true stress and true strain. Phenomena of single and plural necking, stress distribution in the neck and corresponding mode of fracture. 14 ref.

9-13. New Tester Reveals Tungsten Wire Defects. *Iron Age,* v. 159, Jan. 30, 1947, p. 56.

Instrument permits tungsten wire for lamp and radio tube filament production to be subjected to rigid physical test which will accurately reveal flaws or seams in the wire. An outstanding feature of the apparatus is the ability to test a 3-ft. length of wire at one time.

9-14. Determination of Limit of Proportionality of Wires. F. C. Thompson and W. R. Tyldesley. *Nature,* v. 159, Jan. 4, 1947, p. 30.

Novel technique in which the wire itself is used as a "strain gage", the increase of electrical resistance as the load is increased being measured. Typical results are plotted.

9-15. Some Unusual Tests of Cast Iron. James S. Vanick. *Foundry,* v. 75, Feb. 1947, p. 78-83.

Second of two articles describes fatigue, impact, corrosion and heat resistance test methods which differ from standardized procedures. Methods have been compiled by an A.S.T.M. Committee.

9-16. Tensile Strength of Aluminum. Giordano Bruni. *Metal Industry,* v. 70, Jan. 24, 1947, p. 71-72.

Experimental determination of this value at the melting point. The value obtained was confirmed by extrapolating the tensile strength curve to the melting point.

9-17. Ueber Transversale Stabschwingungen und Dauerbruche. (Concerning Transverse Oscillation and Fatigue Rupture.) P. Matthieu. *Schweizer Archiv,* v. 12, Nov. 1946, p. 329-338; Dec. 1946, p. 361-372.

Some of the problems of the determination of stresses in a rod under the effect of transverse oscillating forces were investigated. Solution of such problems consists of: first, calculation of the form of oscillation and, second, determination of the relationships between form of oscillation and fatigue strength limits. Points of maximum stress are located in different parts of the test specimens than was expected. On the basis of the location of these points, the nature of the fatigue stress inducing fracture can be determined.

9-18. Microhardness Testing of Small Tools. G. E. Shubrooks. *Modern Machine Shop,* v. 19, Feb. 1947, p. 124-130, 132, 136.

How the Tukon tester is used with the Knoop indenter to test the hardness of small tools and other extremely small objects.

9-19. Cooling Rate of Test Bars. *Gray Iron Progress,* v. 4, Feb. 1947, p. 4-6.

Results of recent work on standard 1.2-in. bars.

9-20. The Detection of Fatigue Cracks. C. W. Orr. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 9,* Dec. 1946, 14 p.

Various methods and equipment used for crack detection in both ferrous and nonferrous materials. Magnetic particle, fluid penetration, radiographic, etching, lacquer coating, eddy current, and sonic methods and the advantages and limitations of each. Crack propagation and the question of when to inspect and when to reject for fatigue cracks.

9-21. Methods of Investigating the Fatigue Properties of Materials. W. W. Johnstone. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 11,* Dec. 1946, 27 p.

Basic test procedures and some of the common influencing factors. Mechanical methods as used at the C.S.I.R. Division of Aeronautics. Notes concerning other methods.

9-22. Fatigue Tests on Four Welded H-Beams. A. L. Percival and R. Weck. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 14,* Dec. 1946, 20 p.

A method of testing large beam specimens by resonant vibration excited by a mechanical oscillator. Nodal support confines the vibration to the specimen and avoids the use of heavy foundations and the loss of power to the supports. Oscillator consists of two eccentric masses geared together to rotate in opposite directions and is driven by a d.c. motor, speed of which is automatically controlled to maintain a constant amplitude of vibration of the specimen. Mathematical relationships between the stress, amplitude and position of nodes are derived for a uniform beam with a central mass. Specimens used were welded H-beams 6 in. x 5 in. in section and 12 ft. 6 in. long.

9-23. Fatigue Problems in the Gas Turbine Aero Engine. A. R. Edwards. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 22,* Dec. 1946, 12 p.

Major sources of vibration in gas turbines; it is noted that vibrations arising from aerodynamic causes predominate. Mechanically induced vibrations are negligible due to the absence of reciprocating parts. Various design features which aim particularly at the alleviation of vibration and fatigue troubles. Problems involved in the fatigue testing of turbine blades and the limitations of existing laboratory testing equipment. Influence of creep on endurance stresses, as determined by present laboratory methods, at frequencies which are only a small fraction of the vibration encountered in the operating turbine.

9-24. Dislocation Theory as Applied by N.A.C.A. to the Creep of Metals. A. S. Norwick and E. S. Machlin. *Journal of Applied Physics,* v. 18, Jan. 1947, p. 79-87.

An equation for steady-state creep rate in terms of a specific dislocation mechanism which involves considering the generation of dislocations to be a rate process. Theories of rate processes and of dislocation required for the development of the creep equation. 17 ref.

9-25. Creep Deflections in Columns. Joseph Marin. *Journal of Applied Physics,* v. 18, Jan. 1947, p. 103-109.

Rational theory for predicting creep deflections in columns. A special case is applied to the interpretation of some preliminary tests of an aluminum alloy.

9-26. Tuned Air Columns Induce Resonance for Fatigue Testing. *Product Engineering,* v. 18, Feb. 1947, p. 98.

Tuned air columns vibrate the test piece at its own resonant frequency to simulate dynamic loading conditions of reverse bending. Design details of pneumatic fatigue machine.

9-27. The Fatigue Characteristics of Bolted Lap Joints of 24S-T Alclad Sheet Materials. L. R. Jackson, W. M. Wilson, H. F. Moore and H. J. Grover. *National Advisory Committee for Aeronautics Technical Note No. 1030,* Oct. 1946, 67 p.

Details of investigation conducted jointly by Battelle Memorial Institute and University of Illinois, and the results obtained. Main objectives were determination of effect on fatigue strength of such factors as bolt fit, number and arrangement of bolts, and sheet gage (for a given bolt diameter). Sheet thicknesses ranged from 0.102 to 0.375 in. About 950 specimens were tested.

9-28. Fracture of Some Aluminum Alloys Under Combined Stress. E. G. Thompson, D. M. Cunningham and J. E. Dorn. *Transactions of the American Society of Mechanical Engineers,* v. 69, Feb. 1947, p. 81-87.

Thin-walled tubular specimens of aluminum alloys 24S-T, 24S-T80, and 24S-T81 were subjected to axial loads and internal pressures. Ratios of load

to pressure were adjusted to give stress ratios covering the tension-tension and tension-compression fields of biaxial stress. Predictions based upon the "critical normal stress law" were in serious disagreement with the experimental facts, while predictions based upon the "critical shear stress law" were in approximate agreement. (From Part 19, O.P.R.D. Report No. W-225, July 27, 1945.)

9-29. The Theory of Wedge Indentation of Ductile Materials. R. Hill, E. H. Lee and S. J. Tupper. *Proceedings of the Royal Society,* v. 188, Jan. 30, 1947, p. 273-289.

The indentation hardness test has not yet been satisfactorily analyzed in detail on the basis of the mathematical theory of plasticity. The problem of indentation of a material by a lubricated wedge is a first step to a solution of the more complex three-dimensional problem of indentation by a cone or ball. The theory was found to satisfactorily predict the deformation of a grid of squares ruled on a cross section of a lead block.

9-30. Stress Rupture of Heat Resisting Alloys as a Rate Process. E. S. Machlin and A. S. Nowick. *Metals Technology,* v. 14, Feb. 1947, T. P. No. 2137, 13 p.

The theory of rate processes is first discussed, then certain equations derived from the theory are applied to predict stress and temperature dependence of the time of rupture. Agreement with experimental results was obtained for the three alloys investigated. Suggests use of the equations for interpolation and extrapolation, thus reducing the required number of tests, and recommends that the method be investigated more fully as a possible complete substitute for present empirical methods.

9-31. Is There a Relation Between Metallurgy, Engineering and Materials Specifications? Francis G. Tatnall. *Steel Processing,* v. 33, Feb. 1947, p. 92-95.

General discussion of the above question; measurement of service loads, structural static testing, the dynamic or life test, wind tunnel tests and high speed motion pictures, and the performance or service test.

9-32. American Steel Foundries Coil-Spring Test Machine. *Railway Mechanical Engineer,* v. 121, March 1947, p. 120-122.

A test machine for the large helical springs used in the trucks of railway rolling stock. Eight springs, radially disposed about a central crankshaft, are alternately compressed and released 12,000 times an hour, making fatigue testing practicable.

9-33. Malleable Iron Test Bars. J. E. Rehder. *Canadian Metals & Metallurgical Industries,* v. 10, Feb. 1947, p. 14-17.

Since it is difficult to have test bars that will give the exact properties to be expected from a casting, often metal used is much stronger or weaker than planned. They are also of little help in selecting an alternative material. Physical properties of malleable iron and the physical properties necessary in castings made of malleable. New applications of malleable iron. The necessity of testing castings under service.

9-34. The Initiation and Propagation of the Plastic Zone Along a Tension Specimen of Nylon. Julius Miklowitz. *Journal of Colloid Science,* v. 2, Feb. 1947, p. 193-215.

A study of the mechanical factors influencing the initiation and propagation of the plastic zone in nylon gives valuable data for studying localized yielding in mild steel.

9-35. The Stress-Strain Relationship of Nylon Under Biaxial Stress Conditions. Julius Miklowitz. *Journal of Colloid Science,* v. 2, Feb. 1947, p. 217-222.

A method by which the stress-strain characteristics of nylon under equibiaxial tensile stress were investigated. Results are used for comparison with the applied single-stress conditions, under which nylon showed a well-defined yield point and localized yielding. Results shed light on similar phenomena in mild steel.

9-36. Effect of Surface Finish on Fatigue Limit of Mild Steel. J. S. Caswell. *Product Engineering,* v. 18, March 1947, p. 152.

Investigations on the effect of surface scratches in the direction of and transverse to the principal stress direction. Fatigue tests were carried out on mild steel specimens, ground and polished in a circumferential direction, and also on other specimens which were ground and polished in a longitudinal direction. Probable stress distribution along a diameter for specimens ground and polished in the two ways.

9-37. The Initiation and Propagation of the Plastic Zone in a Tension Bar of Mild Steel Under Eccentric Loading. Julius Miklowitz. *Journal of Applied Mechanics,* v. 14, March 1947, p. A21-A30.

Results of several tests with flat tension bars of mild steel under eccentric loading. Theory II is formulated describing how the first wedges, which initiate at the fillets on the load side of the bar, are able to propagate two-thirds of the way across the bar under a practically constant and reduced yield load. How further yielding of

the initial wedges and the formation of additional wedges along the bar come about. In several tests the loading was applied centrically Gage length of the specimen was varied to compare yielding under both types of loading.

9-38. The Initiation and Propagation of the Plastic Zone in a Tension Bar of Mild Steel as Influenced by the Speed of Stretching and Rigidity of Testing Machine. Julius Miklowitz. *Journal of Applied Mechanics,* v. 14, March 1947, p. A31-A42.

Results of several tension tests with round and flat bars of mild steel and iron, under the influence of variations in speed of stretching and testing machine rigidity. Emphasis in this work has been placed upon explaining the yield point phenomena, as viewed externally on a stress-strain diagram, by the observations made and data taken on the internal localized yielding The study has been focused on the initiation of the plastic zone and the propagation of the boundaries of this zone, sometimes called the plastic working lengths, along the length of the tensile specimen.

9-39. The Influence of Size on the Brittle Strength of Steel. N. Davidenkov, E. Shevandin, and F. Wittmann. *Journal of Applied Mechanics,* v. 14, March 1947, p. A63-A67.

Studies of impact cold brittleness. Static bending of notched specimens and impact-tension tests display the size effect and therefore exclude possible influences of stress gradient and of high velocity. Experiments on static tension and bending of cylindrical specimens of brittle phosphorus steel in liquid air reveal the statistical nature of the size effect and give a good qualitative verification of Weibull's theory. 14 ref.

9-40. Fatigue Tests as Criterion of the Weldability of Sheet. R. L'Hermite, D. Seferian and F. Canac. *Materials & Methods,* v. 25, March 1947, p. 128-129.

Tensile and fatigue tests were made on chromium-molybdenum steel containing 0.17% carbon, 0.45% manganese, 1.05% chromium, 0.34% molybdenum and 0.32% nickel. Tests were made on sheet as furnished and after welding with a mild-steel rod. Mean tensile strength as welded was 90% of that of the parent metal, the elastic limit 95%, the elongation 35%, and the endurance limit in repeated bending 73%. Specimens with the best surface had the highest endurance limit, although the reverse did not apply (Condensed from *Inst. Tech. du Vatiment et des Travaux Publics, Circulaire,* Series G, No. 14, Oct. 15, 1946, 28 p.)

9-41. Static and Fatigue Tests of Arc Welded Aluminum Alloy 61S-T Plate. E. C. Hartmann, Marshall Holt and A. N. Zamboky. *Welding Journal,* v. 26, March 1947, p. 129s-138s.

Preliminary information on the static and fatigue strength of metal-arc welded joints of the above alloy with different specimen designs. Experimental procedures, and results.

9-42. Measuring Microhardness by Indentation Tests. E. S. Greiner. *Bell Laboratories Record,* v. 25, March 1947, p. 104-107.

Various techniques described.

9-43. Westinghouse Uses New Jet Metal Test. *Aviation News,* v. 7, March 1947, p. 18.

New test method for high-strength heat-resistant alloys required for jet engines. Disks 1 ft. in diameter, and 1 in. thick are rotated at 35,000 r.p.m. while being heated to 1400° F. This is continued until the disk flies apart.

9-44. The Notched-Bar Impact Test According to Schnadt. J. A. Haring. *Engineers' Digest (American Edition),* v. 4, March 1947, p. 103.

In test bar developed by Schnadt, a hole is drilled in the compression zone opposite the notch, and a loosely fitting hardened steel pin inserted. This procedure is claimed to give more satisfactory results since work is not expended in deformation of material in the compression zone, which deformation is not present in the case of brittle fracture. (Condensed from *De Ingenieur,* v. 58, Dec. 13, 1946, p. 15-17.)

9-45. Abrasion Resistance Analysis of Organic Coatings. Arthur P. Schulze. *Organic Finishing,* v. 8, March 1947, p 9-13, 15, 17

The abrading instrument and five steps in analytical procedure: preparation of specimens; refacing abrading wheels; mounting test panel on tester: performing the test; calculation of numerical wear factor.

9-46. Le Role de l'Etat de Surface dans les Mesures de Dureté. (Influence of the State of Surface on Hardness Testing.) P. Bastien and A. Popoff. *Revue de Métallurgie,* v. 42, Dec. 1945, p. 373-388.

In hardness determination using low loads, two cases are considered: determination without regard to the state of the surface or application of methods resulting in data which characterize the geometrical and physicochemical state of the metal surface. Testing equipment and methods of operation for these two cases.

9-47. Analise do Métado de Ensaio de Dureza Rockwell—Aplicacoes. (Analysis of the Rockwell Method of Hardness

Determination.) E. Orosco. *Boletim da Associacao Brasileira de Metais,* v. 3, Jan. 1947, p. 3-38.

Attempts to establish experimentally a relation between different test conditions and the corresponding Rockwell numbers. A new concept, "sensitivity" of the test, is introduced which permits comparison of test data, using diamonds, cones, and balls of different diameters. 16 ref.

9-48. Stress-Rupture Tests of 5% Chromium Steels With Molybdenum and Titanium. George F. Comstock. *Metal Progress,* v. 51, April 1947, p. 610-611.

Questions the validity of information concerning the high-temperature strength of 5% Cr (Mo + Ti) steels, reported by C. L. Clark in December 1946 issue. Mr. Clark's reply is included.

9-49. Un Nouvel Appareil de Microdurete Le "Microsclerometre L.C." (A New Microhardness Measuring Device: The "L.C. Microsclerometer".) Robert Girschig. *Revue de Metallurgie,* v. 43, March-April 1946, p. 95-112.

The apparatus and possible applications. Although smaller than the ordinary hardness measuring device, this microsclerometer is precise and better adapted to small specimens or fine coatings. Examples of results obtained using the instrument.

9-50. Does Torque Weaken Bolts? H. O. Hill. *Fasteners,* v. 4, no. 1, 1947, p. 10-12.

Tests were made on ⅝ and ¾-in. diameter bolts 11 in. long. Bolts had cut threads and square heads (hot formed) with hexagon nuts. Carbon was 0.15 to 0.24% and threads were class 2, coarse thread, series. The bolts were galvanized. Testing was performed on a 50,000-lb. Riehle lever testing machine. Tension was applied between head and nut by straight pull of testing machine, tightening nut, and combination of the two.

9-51. Monel Cold Upset Collar Studs. V. A. Spoehr. *Fasteners,* v. 4, no. 1, 1947, p. 13-14.

Table presents the result of tests made at the Technological Institute at Northwestern University. Tests were made in a 120,000-lb. Baldwin-Southwark universal tensile testing machine to determine the weakest section of the studs after forming. Loading speeds of 2000 and 5000 lb. per min. were used.

9-52. Généralisation de la Detection de Certaines Fragilités des Aciers. (Generalization of the Determination of Certain Types of Steel Brittleness.) Georges Vidal. *Comptes Rendus,* v. 224, Feb. 6, 1947, p. 394-395.

Temper brittleness can be detected by a low-speed bending test or by an impact test at low temperatures if detection of this phenomenon is impossible by impact test at room temperature. It is now shown that the brittleness resulting from tempering may be determined by impact-bending tests at low temperatures using plain polished test specimens.

9-53. A Rapid Method for Accurate Yield Strength Determination Without Stress-Strain Curves. L. J. Ebert, M. L. Fried, and A. R. Toole. *ASTM Bulletin,* March 1947, p. 50-53.

A method developed for obtaining yield strength of nonferrous materials and heat treated steels suitable for a single operator without the aid of an automatic load-elongation recorder.

9-54. Sur l'Influence de la Forme et des Dimensions de l'Eprouvette sur le Résultat des Essais de Fatigue. (Influence of the Shape and Dimensions of Test Specimens on the Final Results of Fatigue Tests.) Pierre Laurent. *Comptes Rendus,* v. 224, March 10, 1947, p. 719-721.

Experiments have resulted in establishment of a mathematical relationship among fatigue, tensile, and compressive strengths, and the dimensions of the test specimens. The relationship is also shown to be valid by theoretical calculations.

9-55. Tests for Adhesion and Hardness of Surface Coatings. H. Grinsfelder. *Organic Finishing,* v. 8, April 1947, p. 38-42.

Study of the accuracy and reproducibility of five widely used tests for adhesion and hardness of surface coatings. Tests studied were the Sward hardness rocker, the pencil method, the modified Bell Laboratory mar adhesion test, and the fingernail and knife scratching tests.

9-56. Unique Machine Tests Engine Mount Materials. *Automotive and Aviation Industries,* v. 96, May 1, 1947, p. 42, 74.

Machine to test elastic materials measures the rate, hysteresis loss, and efficiency of a mount; and, under dynamic loading conditions, it can be used to evaluate life expectancy.

9-57. Brass Die Castings. *Product Engineering,* v. 18, May 1947, p. 129.

Die-cast brasses yield consistently higher physical properties than sand-cast test bars. Tensile strengths range from 50,000 to 100,000 psi., with elongations ranging from 5 to 25%. Impact strengths of the common copper-base die-casting alloys are grouped fairly closely around 35 ft-lb. Charpy. (From "High Melting-Point Alloys" by H. K. Barton and L. C. Barton. *Mechanical World and Engineering Record,* July 26, 1946.)

9-58. Cast Hardenability Tests. E. W. Pierce. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.*, v. 29, 1946, p. 207-210.

Some of the hardenability work done by various investigators; some of the shortcomings of the present type of test specimens, and need for developing an efficient test method, particularly for intermediate hardening steels.

9-59. New Diamond Hardness Indenter. *Industrial Diamond Review*, v. 7, April 1947, p. 105.

Indenter being made by a French firm for which certain advantages are claimed over the Rockwell indenter and the Vickers pyramid.

9-60. Correlation of Diamond Pyramid and Magnetic Hardness. *Industrial Diamond Review*, v. 7, April 1947, p. 120.

Magnetic hardness is obtained by use of a new instrument called the "Ferroscope". When diamond-pyramid and magnetic-hardness figures are plotted, it is found that the diamond-pyramid hardness increases with magnetic hardness up to a certain point. After this, diamond-pyramid hardness decreases with increase in magnetic hardness. (Abstracted from *Machine Tool Review*, v. 34, May-June 1946, p. 50-52.)

9-61. Testing and Inspection. N. C. Fick. *Metals Review*, v. 20, May 1947, p. 5-8, 47.

Present methods for determining properties of metals, and trends, with notes on the literature.

9-62. Apparatus and Equipment for Testing and Inspection. *Metals Review*, v. 20, May 1947, p. 9-11, 14-15, 17, 19.

1946 developments in testing devices, as described by the manufacturers. Tensile; hardness; fatigue; creep; flaw detection; spectrography; sorting equipment; size inspection.

9-63. Microhardness Testing. *Scientific American*, v. 176, June 1947, p. 265-269.

Instrument which can gage the hardness of a single steel grain at as many as three points within the breadth of a human hair.

9-64. High Temperature Testing. Part I. W. E. Kuhn. *Canadian Metals & Metallurgical Industries*, v. 10, May 1947, p. 20-22, 43.

The effect of high temperature on metals and how to plan an intelligent test program. (To be continued.)

9-65. Microhardness Testing. A. J. Stokes and S. B. Dew. *Automobile Engineer*, v. 37, May 1947, p. 181-186.

Details of a study of the W. 63 (British) aluminum piston alloy. Photomicrographs show effects of different heat treatments and of impressions on different crystal phases.

9-66. Some Aspects of Hot Hardness Testing. K. G. Robinson. *Metallurgia*, v. 36, May 1947, p. 45-46.

Recommended techniques and necessity for standardization.

9-67. Reproducibility of the Single-Blow Charpy Notched-Bar Test. N. A. Kahn and E. A. Imbembo. *ASTM Bulletin*, May 1947, p. 66-74.

Each of seven industrial and government laboratories tested 6 specimens of uniformly stress-relieved, low-carbon, semikilled steel with keyhole-type notches and 6 with the V-type. Six more of each type were sent to the authors' laboratory from each of the cooperating laboratories and were tested there. The results indicate the superiority of the keyhole-notch over the V-notch for the class of steel investigated.

9-68. Constant-Force Fatigue Testing Machine. *Machine Design*, v. 19, June 1947, p. 152.

Machine for fatigue testing sheet materials in flexure.

9-69. Fatigue Testing Machine. B. J. Lazan. *Machine Design*, v. 19, May 1947, p. 123-127.

Below-resonance, centrifugal-force-type fatigue testing machine has inertia-force compensator to insure constancy of the repeated applied force.

9-70. Rockwell Hardness Corrections for Rounds. G. E. Poole and J. Hunt. *Metal Progress*, v. 51, May 1947, p. 775, 776-B.

Experimental program. Nomographs were constructed from curves of hardness on flats vs. hardness on cylindrical surfaces for each of 11 diameters.

9-71. Interpretation of Creep and Stress-Rupture Data. Francis B. Foley. *Metal Progress*, v. 51, June 1947, p. 951-958.

Methods of creep testing, the interpretation of the results, and the mechanism of flow and fracture under long continued loads at high temperature. The latter considerations are then used to indicate methods for obtaining better service from existing alloys, and for devising alloys for extreme conditions.

9-72. Predicting Creep Strength. P. G. McVetty. *Metal Progress*, v. 51, June 1947, p. 959-960.

Referring to the method for predicting creep strength proposed by Kelvin Sproule in the March issue, the author suggests caution in any extrapolation to lower temperatures.

9-73. Indentation Methods for Measuring Wear. *Tool Engineer*, v. 18, June 1947, p. 41-43.

McKee Wear Gage developed at National Bureau of Standards measures extremely small increments of wear—as little as 0.00001 in. under favorable

conditions. Narrow diamond-shaped markings that show a definite change in one or more readily measurable dimensions after relatively small amounts of wear are applied to the working surfaces.

9-74. Bolt Tension Vs. Installation Torque on Zinc and Cadmium-Plated Nuts, Bolts and Washers. Wilbur Gross. *Monthly Review,* v. 34, July 1947, p. 818-822.

Test results are tabulated and charted for various types of assemblies and combinations.

9-75. Brinell Hardness Does Not Measure Machinability. Georg Schlesinger. *American Machinist,* v. 91, July 17, 1947, p. 125-136.

The results of reliable tests made in the United States, Europe, and Great Britain. The accumulated data on material, Brinell hardness, cutting speed, tool life, power consumption, and specific cutting resistance show the true status of Brinell as a criterion of machinability.

9-76. Discussion of Paper: "Correlated Brittle Fracture of Notched Bars and Simple Structures". Wendell P. Roop. *Welding Journal,* v. 26, June 1947, p. 333s-334s, 357s.

Extensive discussion refers to paper by MacGregor, Grossman, and Shepler, published in Jan. issue. Authors' reply.

9-77. The Tensile-Shear Stress Ratio in Rolled Copper Alloys. Maurice Cook and T. Ll. Richards. *Journal of the Institute of Metals,* v. 14, May 1947, p. 541-551.

Value of the ratio of shear stress to ultimate tensile stress decreased from about 0.8 for annealed to about 0.5 for hard rolled strip. The high values for annealed and less heavily rolled strips are due to the considerable uniform elongation and consequent reduction in cross-sectional area which occurs before test-pieces of such material fail in tension. When the shear stress is related to the true tensile stress, the ratio approximates 0.5, and is independent of the condition of the material.

9-78. The Evaluation of Mechanical Properties of High-Tensile Steel for Welded Structures. Otto Graf. *Welding Journal,* v. 26, June 1947, p. 367s-368s.

Results of a series of experiments which included examination of structure, chemical analysis, usual mechanical properties, creep at constant load, pulsating fatigue limit, bending of plates with welded bead, notch-impact test, behavior of large I-beams in bending, on a series of low-alloy steels containing various amounts of Si, Mn, Cr, Mo, and Al. (Translated and abstracted from *V. D. I. Zeitschrift,* v. 87, July 10, 1943, p. 422.)

9-79. High Temperature Testing. Part II. W. E. Kuhn. *Canadian Metals & Metallurgical Industries,* v. 10, June 1947, p. 27-29, 50.

The effect of high temperature on metals and the planning and organizing of an intelligent test program.

9-80. High Creep Strength Austenitic Gas Turbine Forgings. (Concluded.) D. A. Oliver and G. T. Harris. *Engineer,* v. 183, June 6, 1947, p. 502-503.

Results of experimental work on creep of G.18B and R.20 steels. The use of creep data for solid rotor forgings and the present state of gas turbine development from the metallurgical point of view. General observations on the creep testing of materials at elevated temperature. (Condensed from paper presented to Institute of Marine Engineers, April 1947.)

9-81. Gas Turbine Forgings. D. A. Oliver and G. T. Harris. *Iron and Steel,* v. 20, June 1947, p. 333-336.

Development of high-creep-strength austenitic steels. (Paper presented to the Institute of Marine Engineers. To be concluded.)

9-82. Osservazioni e Risultati Intorno Alla Prova di Compressione dei Materiali Metallici. (Observations and Results of Compression Tests on Metallic Materials.) G. Bonfiglioli. *Alluminio,* March-April 1947, p. 101-110.

A newly developed test apparatus intended specifically for compression tests on light metals. Methods of application of this apparatus and the data obtained for a series of light metals. Relationship between compression- and tensile-test results.

9-83. Testing Wrought Steel Wheels. Reid L. Kenyon. *Railway Mechanical Engineer,* v. 121, July 1947, p. 347-350, 353.

Special wheel testing machine developed by Armco engineers permits subjection of wheels to conditions even more severe than those encountered in service. Automatic control and recording instruments are included. Various cycles of brake application and cooling have been developed to reproduce thermal cracking and plate failure of wheels in a manner similar to rupture in service.

9-84. Machine Pour Essais de Forgeabilité des Aciers et Resultats d'Essais. (Machine for Testing the Forgeability of Steels and Test Results.) Robert Canard. *Revue de Metallurgie,* May-June 1946, p. 156-161.

The machine measures elongation as a function of temperature for different samples of steel and iron. The extent of the critical zone and its classification from the point of view of forgeability may be readily determined with this apparatus.

9-85. The Progress of Failure in Metals as Traced by Changes in Magnetic and Electrical Properties. P. E. Cavanagh. *American Society for Testing Materials Preprint 26,* 1947, 9 p.

Relative changes in magnetic and eddy-current losses during normal endurance tests in a rotating-beam machine for six metals at loads above and below the endurance limit. Endurance tests were run at various test speeds. 27 ref.

9-86. The Velocity Aspect of Tension-Impact Testing. William H. Hoppmann, II. *American Society for Testing Materials Preprint 32,* 1947, 12 p.

The guillotine impact testing machine of the Navy for studying the effect of moderately high velocities on the impact resistance of materials and minor structural elements. The method of Theodore von Kármán for dealing with the propagation of plastic deformations in solids, together with his concept of "critical velocity". Utilizing the von Kármán method, the critical velocity for a hard drawn copper has been calculated. 19 ref.

9-87. Etude de la Dispersion des Essais de Traction sur les Fontes Grises Pearlitiques. (Study of the Distribution of Tensile Test Values for Pearlitic Gray Irons.) Paul Bastien and Louis Beugras. *Comptes Rendus,* v. 224, May 12, 1947, p. 1330-1332.

Two types of test specimens were subjected to a series of tensile tests to determine the distribution of values. Grouping of the values is in accord with Gauss's law. These data characterize the pearlitic gray iron more precisely than shear and bending-test data.

9-88. Observations on Conducting and Evaluating Creep Tests. W. Siegfried. *Journal of the Iron and Steel Institute,* v. 156, June 1947, p. 189-207.

Sustained-load tests on various heat resistant alloys used in the construction of gas turbines. Results evaluated in terms of the main problems presented by gas-turbine design. Problems of three-dimensional stressing at high temperatures and the influence of notches on hot strength. Results of sustained-load tests on smooth and notched bars at high temperatures. 16 ref.

9-89. Tensile Testing. *Iron and Steel,* v. 20, July 1947, p. 362.

Entirely new type of universal tensile and compression testing machine being sold by British firm.

9-90. End-Quenched Specimens. W. I. Pumphrey. *Iron and Steel,* v. 20, July 1947, p. 371-372.

Methods for polishing a flat along the length of the Jominy bar for hardness measurement after end quenching and a fixture for positioning the bar when taking hardness measurements along the flat.

9-91. A New Method of Measuring Wear of Machinery Surfaces. F. G. Brickwedde. *Instruments,* v. 20, July 1947, p. 620-622.

New technique in which length of a diamond-pyramid indentation in the surface decreases in proportion to the thickness of material removed.

9-92. Factors Affecting the Technical Hardness of Magnesium. Louis A. Carapella and William E. Shaw. *Light Metal Age,* v. 5, July 1947, p. 8-10.

Shortcomings of Brinell testing; standard conditions for hardness testing. 10 ref.

9-93. Basic Physical Tests for Steels. *Oil and Gas Journal,* v. 46, July 26, 1947, p. 291.

Descriptive.

9-94. Talks About Steelmaking. Harry Brearley. *British Steelmaker,* v. 13, July 1947, p. 338-340.

Tensile testing. Author believes that it will become obsolete.

9-95. Determination of Knoop Hardness Numbers Independent of Load. L. P. Tarasov and N. W. Thibault. *Transactions of American Society for Metals,* v. 38, 1947, p. 331-348; discussion, p. 348-353.

A very precise Knoop hardness number independent of load can be computed for a given specimen from the lengths of indentations made at several different loads. A constant length correction found by trial and error results in essentially the same hardness number for each of the loads. This hardness number is given for molded boron carbide, a cemented carbide, a hardened toolsteel, and for single crystals of silicon carbide, aluminum oxide, topaz, and quartz.

9-96. Hardenability of Shallow Hardening Steels Determined by the P-V Test. B. F. Shepherd. *Transactions of American Society for Metals,* v. 38, 1947, p. 354-385; discussion, p. 385-397.

A new test specifically suited for steels which require cooling rates faster than 80° F. per sec. at 1300° F. for the microstructure to retain 50% martensite.

9-97. Changes in Microhardness of Metals in Relation to the Depth of Penetration of the Indenter and Condition of the Surface Layer. A. A. Bochvar and O. S. Zhadaeva. *Bulletin of the Academy of Sciences of the U.S.S.R. (Section of Technical Sciences),* no. 3, 1947, p. 341-348. (In Russian.)

Microhardness tests on a series of nonferrous specimens cast on a polished plate so as to furnish a mirror surface. The tests were duplicated on

the same specimens after polishing the original surface. In all instances, the hardness of the original mirror surface was lower than that of the polished surface. The workhardening characteristics of the polished surface were also different from that of the original surface.

9-98. Tests for Weld Metal; a Critical Estimate of Present Methods. H. Martin. *Welding,* v. 15, July 1947, p. 317-322.

Value of tests on weld-metal specimens and their relationship with the number of runs and the gage of electrode used. More efficient testing methods are suggested to replace those accepted at present.

9-99. A Comparison of Test Bar Designs Cast in 85-5-5-5 Alloys. L. W. Eastwood and J. G. Kura. *Foundry,* v. 75, Aug. 1947, p. 76-80, 226, 228, 230, 232, 234.

An extensive study of test-bar design to determine the correlation of test-bar properties with melt quality.

9-100. Structural Variations in Gas Turbine Alloys Revealed by the Stress-Rupture Test. Nicholas J. Grant. *Transactions of American Society for Metals,* v. 39, 1947, p. 335-359; discussion, p. 359-367.

In order to determine why occasional cast high-temperature, high-strength alloys of the Co-Cr-Mo-Ta system failed to produce consistent results, the effect of the mold preheat and metal-casting temperatures on rupture properties was studied in precision investment casting. A distinct relationship exists among the casting temperature of mold and metal, the structural variables of the alloy, and rupture and ductility properties.

9-101. The Effect of Composition and Structural Changes on the Rupture Properties of Certain Heat Resistant Alloys at 1500° F. Nicholas J. Grant. *Transactions of American Society for Metals,* v. 39, 1947, p. 368-402; discussion, p 402-403.

Two low-carbon high-temperature, high-strength alloys, Vitallium and 6059, were prepared for rupture testing at 1500° F. by the precision hot-investment casting technique. Mold preheat temperature and metal pouring temperature were varied in the ranges 1500 to 2000° F. and 2600 to 2820° F., respectively. Correlations exist between casting variables and alloy structures. These structural variations in turn control the strength and ductility of the alloys.

9-102. Tensile Testing at Elevated Temperatures. A. W. Brunot. *Steel,* v. 121, Aug. 4, 1947, p. 90-91, 110, 112.

Comparatively new method for tests at 1500° F., using six furnaces. One operator can easily average 35 tests per shift.

9-103. Engineering Significance of Metals Testing. Blake D. Mills, Jr. *Iron Age,* v. 160, Aug. 7, 1947, p. 78-83.

Several important types of physical testing methods, including tension tests, compression tests, notched-bar tests, high-velocity tests, creep tests, and fatigue tests, with particular reference to their correlation with engineering practice. The use of statistical methods for checking material quality.

9-104. The Bend Test for Hardened High Speed Steel. Arthur H. Grobe and George A. Roberts. *American Society for Metals Preprint No. 22,* 1947. (To be published in *Transactions* for 1948.)

Three factors were investigated: specimen size; single and double-point loading; and number of specimens necessary to obtain reasonably accurate values of yield strength, bend strength, plastic deflection, and total deflection. The bend-test properties were determined for an 18-4-1 high speed steel quenched from six different temperatures. The effect of tempering on the bend-test properties over a wide range of tempering times and temperatures was studied for two high speed steels.

9-105. Yield Strength; Rapid Determination Without Using Stress-Strain Curves. L. J. Ebert, M. L. Fried, and A. R. Toole. *Metal Industry,* v. 71, July 25, 1947, p. 67-69.

A method for determining accurately the yield strength of nonferrous materials and heat treated steels with one operator and without an automatic load-elongation recorder. (A recent A.S.T.M. paper.)

9-106. Les Tendances Americaines dans les Essais d'Endurance. (American Trends in Endurance Testing.) H. W. Gillett, H. J. Grover, and L. R. Jackson. *Revue de Metallurgie,* v. 43, Sept-Oct. 1946, p. 268-270.

A review of the subject by American authors.

9-107. Difficultes dans l'Execution et l'Interpretation des Essais de Fatigue a la Flexion Rotative. (Difficulties in the Execution and Interpretation of Rotational Bending Fatigue Tests.) J. de. Lacombe. *Revue de Metallurgie,* v. 43, Sept-Oct. 1946, p. 271-284.

Numerous fatigue tests conforming to French aeronautic standards were performed on large test specimens. Difficulties in obtaining precise data include variable dispersion from one group of tests to another, heterogeneity of the steel, globular inclusions, and coatings of grease. 15 ref.

9-108. The Micro-Sclerometer. M. R. Girschig. *Industrial Diamond Review,* v. 7, July 1947, p. 208-211.

New microhardness tester for use in combination with inverted type microscopes for determining the diamond pyramid hardness of specimens of small dimensions (metal-foils, watch components) and of hard and brittle substances (glass, enamel, minerals). Construction of the instrument. (Translated and condensed from *Revue de Metallurgie*, v. 43, 1946, p. 95-112.)

9-109. Some Changes in Physical Properties of Steels and Wire Rope During Fatigue Failure. P. E. Cavanagh. *Canadian Institute of Mining and Metallurgy, Transactions* (Bound with *Canadian Mining and Metallurgical Bulletin.*) July 1947, p. 401-411.

Nondestructive testing to detect changes which occur in steel prior to fatigue failure; a magnetic test method for detecting early stages of failure. Changes in magnetic properties may indicate either increase or decrease in fatigue life, hence indication of continuous change over a considerable time is required in order to have a positive indication of the inception of fatigue failure.

9-110. Measuring Creep. G. R. Gohn. *Bell Laboratories Record*, v. 25, Aug. 1947, p. 311-313.

Creep measurement on sections of cable sheath.

9-111. Preparation of Test Specimens. G. L. Smith. *Sheet Metal Industries*, v. 24, Aug. 1947, p. 1609-1614.

Methods of preparing test specimens used in a research laboratory engaged in the production of steel and steel tubes. The preparation of sulphur print specimens, macros, and micros, and the general methods of preparation of the commoner test pieces (tensile, impact, creep).

9-112. Cast and Extruded Magnesium Alloys. D. E. Dineen and N. D. Benson. *Metal Industry*, v. 71, Aug. 8, 1947, p. 103-105.

Some mechanical tests at room and low temperatures.

9-113. Method for Predicting Failure of Metals. P. E. Cavanagh. *Petroleum Engineer*, v. 18, Aug. 1947, p. 120, 122, 124; discussion, p. 127-128.

Possibilities of using changes in high-frequency magnetic and eddy-current losses to predict failure in metals. Method of recording and examples of stress-core loss curves obtained.

9-114. Influence of Plastic Extension and Compression on the Fracture Stress of Metals. D. J. McAdam, Jr., G. W. Geil and W. H. Jenkins. *American Society for Testing Materials Preprint 30*, 1947, 19 p.

Results of longitudinal and transverse tests on cold-extended steel plate and of tension tests on previously compressed cylindrical steel bars. The general effect of plastic deformation on the fracture stress is a work-hardening effect similar to the effect on the flow stress. Conclusion is that any kind of plastic deformation of any polycrystalline metal affects the fracture stress in the same way that it affects the corresponding flow stress.

9-115. Determination of Stress-Rupture Parameters for Four Heat Resisting Alloys. William G. Lidman. *National Advisory Committee for Aeronautics, Research Memorandum No. E7G 18a*, Aug. 25, 1947, 16 p.

Stress-rupture data for four heat resisting alloys analyzed according to the equations of the theory of rate processes. Parameters of structure and composition for forged S816, cast S816, cast S590, and cast Vitallium and method of obtaining these parameters.

9-116. Variation of the Damping Decrement of Turbine Blades in Service. L. A. Glikman and M. I. Grinberg. *Engineers' Digest (American Edition)*, v. 4, Aug. 1947, p. 364-366.

Failures of turbine blades of the ninth stage in a powerful steam turbine, which were obviously due to fatigue, led to investigations into the vibrations of these blades. The object was to determine the natural frequency of the blade groups, or "packets", and to ascertain the possibilities of tuning the blades. (Translated and condensed from *Journal of Technical Physics*, v. 16, no. 9, 1946, p. 985-992.)

9-117. Mechanical Tests of Aluminum and Aluminum Alloys. *Aluminium and the Non-Ferrous Review*, v. 12, April-June 1947, p. 43-45.

Condensed from publication of Northern Aluminium Co., Ltd. (To be continued.)

9-118. Proving Rings. *Engineering*, v. 164, Aug. 22, 1947, p. 169-172.

Devices for calibrating testing machines at the National Bureau of Standards. (See NBS Circular C454, 1946.)

9-119. Creep Tests; Their Conduct and Evaluation. W. Siegfried. *Iron and Steel*, v. 20, Aug. 1947, p. 396-397; discussion, p. 405-407.

Sustained-load tests carried out on various highly heat resistant alloys used in the construction of gas turbines. Results are evaluated in terms of the main problems in gas turbine design.

9-120. New Hardness Tester. T. Dobry. *Industrial Diamond Review,* v. 7, Aug. 1947, p. 244-245.

In the instrument described the impression is made mechanically, and measurements are made optically, so that one can either magnify the image of the impression or project it onto a screen. (Translated and abstracted from *Hutnicke Listy,* v. 1, 1946, p. 177-180.)

9-121. New Apparatus for Axial-Load Fatigue Testing. William N. Findley. *ASTM Bulletin,* Aug. 1947, p. 54-56.

Fatigue testing machine permits testing of specimens in axial tension or compression. The machine is designed with provision for detecting and correcting strains introduced into the specimen when it is fastened to the machine. Thus the stress may be made more nearly uniform over the cross section of the specimen than is usually possible.

9-122. Discussion of Paper on Reproducibility of the Single-Blow Charpy Notched Bar Test. L. D. Jaffe. *ASTM Bulletin,* Aug. 1947, p. 88-89.

Comparison of V-notch and keyhole specimens. Authors' reply by N. A. Kahn and E. A. Imbembo.

9-123. La Résilience. (Resilience.) H. Jolivet. *Revue de Métallurgie,* v. 43, Nov-Dec. 1946, p. 318-326.

Tests for resilience, their history, background, and usefulness. Such values are believed to be quite arbitrary and not of great significance. Improvements in methods are desirable.

9-124. La Mesure du Travail de Rupture au Choc d'Un Coupon de Rail Entaillé. (Measurement of Impact Rupture Fatigue in a Notched Rail Section.) Marcel Perrey. *Revue de Métallurgie,* v. 43, Nov-Dec. 1946, p. 336-346.

Industrial method for measuring fatigue in notched rail sections.

9-125. The Notched-Bar Impact Test Piece. *Engineer,* v. 184, Aug. 29, 1947, p. 197.

Review of two recent articles giving tables and diagrams.

9-126. Notes on Machinability Testing Apparatus and Tests Carried Out at the Naval Ordnance Inspection Department, Sheffield, Including a Development of the Drill Test. D. G. W. Curry. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 244-246; discussion, p. 267-291.

Results for a number of different steels. (War Emergency Issue No. 20.)

9-127. Standardization of Tools for Machinability Tests. C. H. Booth. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 246-247.

Recommended procedures. (War Emergency Issue No. 20.)

9-128. A Tentative Method of Assessment of Machinability. C. W. George. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 248-255; discussion, p. 267-291.

Method indicates to users of specific material the ease of its machinability. Standard test pieces are subjected to a series of standard machining operations. For each, a rating of "free", "medium", or "difficult" is assigned. Ratings for a steel and for an aluminum alloy, obtained by three different companies, are tabulated. (War Emergency Issue No. 20.)

9-129. Tool Wear as a Measure of Machinability. C. Eatough. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 255-257; discussion, p. 267-291.

New test procedure which enables solid test bars of appreciable size to be used, and test results for five steels. (War Emergency Issue No. 20.)

9-130. Testing Methods Using Pendulum Machines. A. S. Kenneford. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 241-243; discussion, p. 267-291.

Oxford-Airey and the Leyensetter machines, and results obtained with the former for effects of feed, depth of cut, and top rake on energy absorbed, effects of cold drawing and grain size on machinability of steel, and effect of lead additions on machinability of 70-30 brass. (War Emergency Issue No. 20.)

9-131. Novy Pristroi Ceskoslovenske Produkce k Mereni Tvrdosti. (A New Czechoslovakian Apparatus for Measuring Hardness.) Jaroslav Dobry. *Hutnické Listy,* v. 1, Feb. 1947, p. 177-180.

Lightness and portability are the advantages claimed, without loss of precision.

9-132. Method for Determining the Depth of Annealing of a Deep Hardening Structural Steel. B. E. Somin. *Factory Laboratory (U.S.S.R.),* v. 13, July 1947, p. 832-840. (In Russian.)

Results obtained with new specimens are charted and tabulated and compared with those from other types of specimens. Results are claimed to be more reliable with the new specimens. Data for several Soviet steels, the compositions of which are furnished.

9-133. The Yield Point of High-Chromium Stainless Steels, as Determined by a Cone-Extrusion Method. M. F. Sichikov, B. P. Zakharov, and Iu. V. Kozlova. *Factory Laboratory (U.S.S.R.),* v. 13, July 1947, p. 854-858. (In Russian.)

Results of application of above method to two stainless steels. Steel and diamond cones gave practically

the same results. Simplifications of the procedure described by Tammann and Müller.

9-134. An Indirect Method for Determining Resistance to Destruction. M. P. Markovets. *Factory Laboratory (U.S.S.R.)*, v. 13, July 1947, p. 870-878. (In Russian.)

Difficulties connected with determination of the true resistance to fracture of metal test specimens are pointed out and an indirect theoretical method is worked out which is claimed to be superior to any previously proposed. A comparison of the experimental with the calculation method for a series of metals shows an average deviation of 5.8%. Application of the method at high temperatures. 14 ref.

9-135. Utilization of Stamping Devices for Experiments With Sheet Metal. B. P. Zvorono. *Factory Laboratory (U.S.S.R.)*, v. 13, July 1947, p. 879-882. (In Russian.)

The possibility of testing thin sheet metal by measurement of the energy required for punching holes and other operations on the sheet. Two instruments designed to measure this energy —the first, by deformation of a heavy spring or rubber, the second by comparison of the diameters of the impressions made by a ball on the sheet tested and on a standard specimen 11 ref.

9-136. A Device for Testing the Performance of the Rockwell Hardness Tester. T. A. Vvedenskii. *Factory Laboratory (U.S.S.R.)*, v. 13, July 1947, p. 890-891. (In Russian.)

Briefly described and illustrated.

9-137. Twelve-Ton Testing Machine, Type IM-12. I. V. Kudriavtsev. *Factory Laboratory (U.S.S.R.)*, v. 13, July 1947, p. 892. (In Russian.)

New Soviet machine.

9-138. Testing Gun Steel and Other Alloys and Metals for Resistance to Surface Cracking. Earl Ingerson. *Metals Technology*, v. 14, Aug. 1947, T.P. 2223, 13 p.

Bore surfaces of used guns usually show a pattern of cracks in various degrees of development. The amount and type of surface cracking taking place in gun steel and various other materials which might be used for gun bores was determined by use of a special test apparatus and procedure. (Presented at Chicago Meeting of A.I.M.E., Oct. 1947.)

9-139. Testing the Superalloys. T. Y. Wilson. *Steel Horizons*, v. 9, no. 4, 1947, p. 14-16.

Test equipment and procedures used in Allegheny Ludlum's laboratories.

9-140. Influence de la Forme Des Lingots-Eprouvettes sur les Résultats Des Essais de Traction des Bronzes à L'Etain. (Influence of the Shape of Test Ingots on the Results of Tension Tests on Tin Bronzes.) Georges Blanc. *Fonderie*, July 1947, p. 721-730.

After experimenting with ingots of various shapes, the French Maritime Service specified the modified cross-shaped ingot, with arms 15 x 15 mm.

9-141. An Indentation Method for Measuring Wear. Samuel A. McKee. *Journal of Research of the National Bureau of Standards*, v. 39, Aug. 1947, p. 155-161.

Method for accurately measuring the wear that takes place on the bearing surfaces of machinery consists of making minute indentations in the wearing surface by means of a specially shaped diamond point and measuring the dimensions of marks before and after wear. Apparatus for using this method for the measurement of wear occurring in the cylinders of aircraft engines. Curves show typical wear data obtained.

9-142. New Indentation Method Determines Equipment Wear. *World Oil*, v. 127, Oct. 1947, p. 104, 108, 110.

Use of McKee wear gage developed by Bureau of Standards.

9-143. Comparison Chart of Degrees of Hardness of Abrasive Minerals. *Production Engineering & Management*, v. 20, Oct. 1947, p. 83.

Compares arbitrary numbers of the Mohs System (year 1818) with degrees of hardness determined by present-day scientific procedures.

9-144. Important Considerations in Charpy and Izod Testing. Part I. C. M. Schwitter. *Product Engineering*, v. 18, Oct. 1947, p. 106-109.

Details of the various types of standard test specimens and the advantages of each. Conditions necessary for accurate results. (To be continued.)

9-145. Hardness of Vapor-Deposited Chromium Coatings. N. S. Gorbunov, N. D. Iudin, and N. A. Izgaryshev. *Journal of Applied Chemistry (U.S.S.R.)*, v. 20, no. 4, 1947, p. 304-308. (In Russian.)

The apparatus used for microhardness testing of these coatings on soft iron, cast iron, steel, and chromansil, and results of the measurements. In most of the cases the content of the base metal had an effect on the hardness of the coating.

9-146. Hardness Testing Method for Small Cylindrical Workpieces. M. C. Attinger. *Industrial Diamond Review*, v. 7, Sept. 1947, p. 264-265.

A chisel edge with only two faces is pressed, at a certain pressure and without shock, perpendicular to the axis of the sample. The surface of the impression is determined after the indenter has been withdrawn. The hardness is given by the ratio of the load to the surface area. The mathematics of the method, the apparatus and technique, and test results. Comparison with Vickers hardness for nine hardened steel cylinders from 0.08 to 0.94 mm. in diameter. (Translated from *Bull. Annuel de la Soc. Suisse de Chronometrie et du Laboratoire Suisse de Recherches Horlogeres (Lausanne)*, v. 2, 1946, p. 321.)

9-147. A New Portable Hardness Tester. *Industrial Diamond Review*, v. 7, Sept 1947, p. 266.

New British instrument.

9-148. The Micro-Sclerometer: A New Microhardness Tester. M. R. Girschig. *Metallurgia*, v. 36, Sept. 1947, p. 269-273.

New instrument designed for use on metallurgical microscopes possesses a number of interesting features. Applications of the instrument and a comparison of hardness numbers obtained by different loads. (Translated and condensed from *Revue de Metallurgie*, v. 43, 1946, p. 95-112.)

9-149. The Effect of Notching on Materials of Construction Under Static and Dynamic Tension. (Maximum Testing Velocity 29 Ft. per Sec.) Georges Welter. *Metallurgia*, v. 36, Sept. 1947, p. 283-286.

Results of static and dynamic tests performed in order to determine the effect of notches in specimens of various construction materials. Total energy, elongation, and energy absorbed per unit volume, for six different materials, were measured on specimens tested at a rate of straining of 0.005 ft. per sec. and compared with the same values measured on identical specimens strained about 20,000 times faster. Tests confirm previous conclusions to the effect that the dynamic strength of cylindrical 2-in. gage-length specimens, at a speed of 11.78 ft. per sec., is up to 60% higher than the static strength, depending on the material tested; in the case of zinc, it is 100% higher (To be continued.)

9-150. A Nondestructive Magnetic Hardness Tester. W. H. Meiklejohn. *Electronic Industries & Electronic Instrumentation*, v. 1, Oct. 1947, p. 14-15, 45.

General Electric's magnetic hardness tester for production testing of small steel parts.

9-151. Six-Ton Schenck Fatigue Testing Machine. *Headquarters Air Materiel Command Technical Report 5623*, Oct. 1947, 23 p.

Use of the resonance principle in the Schenck (German) fatigue testing machine. Different specimen shapes; procedure for operating the machine and a preliminary SN diagram for S.A.E. 2330 steel under fluctuating tensile and reversed stresses.

9-152. Bend Testing of Armature Binding Wire. *Steel*, v. 121, Oct. 27, 1947, p. 92.

Test procedures for tin-coated wire used at General Electric Co.'s Works Laboratory, Erie, Pa.

9-153. Method of Determining Brittle Strength of Hot Worked Structural Steels. Ia. M. Potak and S. I. Magazanik. *Factory Laboratory (U.S.S.R.)*, v. 13, April 1947, p. 463-471. (In Russian.)

The usual methods do not give results indicative of actual conditions leading to structural failure. A satisfactory method was therefore developed which takes into consideration the difference between strength in the normal and tangential directions. Test results on a number of steels showing effects of different heat treating temperatures.

9-154. Method for Testing of Metals by Rolling Wedge-Shaped Specimens. A. I. Chipizhenko. *Factory Laboratory (U.S.S.R.)*, v. 13. April 1947, p. 471-475. (In Russian.)

Because of the continuous variation in the width of such specimens, relatively few tests are required to determine the physical and mechanical properties of metals as affected by the degree of deformation. The method and its use on brasses containing different amounts of lead for both cold and hot rolling at different temperatures.

9-155. Determination of Mechanical Properties of the Steel in Completed Structures by Testing of Small Ring-Shaped Specimens. A. N. Mitinskii and Iu. S. Ivanov. *Factory Laboratory (U.S.S.R.)*, v. 13. April 1947, p. 475-479. (In Russian.)

Method and equipment for removal of the specimen; its use in determination of properties; use for identification of the type of steel; typical results.

9-156. Effect of Method of Notching of "Menage" Specimens on Impact Testing of Steel. S. E. Beliaev and T. K. Panar'ima. *Factory Laboratory (U.S.S.R.)*, v. 13, April 1947, p. 500-501. (In Russian.)

Specimens prepared by three methods. Lowest impact resistances shown for specimens prepared by abrasive-wheel cutting after hot working.

9-157. Device for Adjustment of Specimens During Impact Testing and Results of Test on Displaced Notches. D. M. Zagorodskikh. *Factory Laboratory*

(U.S.S.R.), v. 13, April 1947, p. 503-505. (In Russian.)

Simple jig for the above. Results of notch tests on two steels with the notches displaced various small distances from the proper location.

9-158. Repeated-Impact Bending Tests. N. F. Lashko. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 600-606. (In Russian.)

Results of testing to failure on the Amsler machine of specimens of different steels and aluminum alloys.

9-159. Elongation Curve of Metals Upon Impact. A. Lobko. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 607-610. (In Russian.)

A method for construction of such curves from experimental data obtained with specimens having a cylindrical section in the center and tapering conically to the two ends, which are of greater diameter than the center. Mathematical relationships are developed and verified, between cone angle, maximum and minimum diameters, and stresses required for beginning of deformation and for failure, respectively, for two steels.

9-160. Volume-Weight Indicator for Estimation of the Plasticity of Sheet Materials. I. M. Roitman. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 611-617. (In Russian.)

A simple method based on measurement of volumes and weights of tensile specimens before and after testing to failure. Formulas for calculation of "volume-weight indicator" and "coefficient of drawing". Experimental data for a variety of sheet metals.

9-161. High-Speed Impact-Testing Machine for Determination of Bending and Expansion. N. N. Davidenkov and A. V. Noskin. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 722-729. (In Russian.)

New machine is capable of speeds up to 300 m. per sec. Results on three different alloy steels.

9-162. Method for Determination of Modulus of Elasticity of the Metal in Thin Bimetallic Rings. M. M. Khruschov and M. A. Babichev. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 729-737. (In Russian.)

A new method and test machine for direct determination without use of specially prepared flat test specimens. Results are of special value for determination of stresses during fatigue testing of steel rings inlaid with antifriction (bearing) metals. Results for a series of bearing metals.

9-163. Methods of Mechanical Testing for Special Saw Steels. E. V. Zotova and A. A. Nefedov. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 737-740. (In Russian.)

Mechanical properties (tensile strength, Rockwell hardness, and plasticity) do not fully characterize these steels. More reliable results are obtained by less severe methods, especially by torsion testing. Influence of tempering temperature on mechanical properties of a series of saw steels.

9-164. Dilatometric Testing of Thin Specimens Using an Especially Designed Adapter. A. Ts. Spektor. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 756. (In Russian.)

An adapter which facilitates the test procedure.

9-165. Influence of Method of Notch Preparation on Impact Strength. M. D. Derebizov and G. I. Nazarova. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p 764-766. (In Russian.)

A comparison of different methods. Factors of importance are: whether the notch was prepared before or after heat treating, and whether it was made by cutting or grinding. Differences as high as 3 kg. per sq.cm. were found.

9-166. Charpy and Izod Testing. Part II. C. M. Schwitter. *Product Engineering,* v. 18, Nov. 1947, p. 159-162.

Limits of reproducibility for test results; significance of impact tests, industrial applications.

9-167. Influences de la Forme de L'Eprouvette et de la Vitesse de Mise en Charge sur la Dispersion des Essais de Traction sur Fontes. (Effects of the Shape of the Test Specimen and the Loading Rate on Scatter in Tensile Tests on Cast Iron.) Paul Bastien and Louis Beugras. *Fonderie,* Aug. 1947, p. 751-758.

Tensile-tests reported are compared with results of shear and bending tests on the same types of specimens. The tensile test data are considered to be far more accurate for the determination of the mechanical strength of small cast-iron test specimens than the shear and bending test results.

9-168. Die Verpressbarkeit von Eisenpulver. (Compressibility of Iron Powder.) F. Eisenkolb. *Stahl und Eisen,* v. 66-67, Feb. 27, 1947, p. 78-82.

A new method for the above in which a series of small cylindrical test specimens of exactly the same size and weight are compared using a special machine, the pressure in which increases regularly for each specimen tested. The last pressure at which the compressed specimen does not disintegrate is considered as the compressibility.

9-169. Surface Hardness Comparator. *Industrial Diamond Review,* v. 7, Oct. 1947, p. 298.

British-made comparator consists of a plastic holder with nine projecting steel pins of different hardnesses. To determine surface hardness, adjacent pins are rubbed across the surface to be tested until one pin scratches the surface, whereas the other slides.

9-170. Progres dans la Mesure de Frottement Interieur des Métaux et des Alliages au Micropendule de Coulomb. (Progress in Determination of Internal Friction of Metals and Alloys Using Coulomb's Micro-Pendulum Testing Machine.) Christian Boulanger. *Comptes Rendus,* v. 225, Oct. 13, 1947, p. 624-626.

Modifications in the machine made during research on internal friction of metals and alloys. These made it possible to determine decrements of less than 0.0001 under stresses of several kg. per sq.mm.

9-171. L'Essai de Fatigue Sous Charge Progressive. (Fatigue Tests Under Progressive Load.) Marcel Prot. *Comptes Rendus,* v. 225, Oct. 20, 1947, p. 669.

Shows by theoretical considerations and experimental data that when fatigue testing is conducted with the stress increasing directly with time throughout the test, instead of with constant stress, the stress at failure will be equal to the time times a constant for the particular specimen. Plotting stress at moment of rupture vs. square root of the coefficient of increment results in an almost straight line whose intersection with the stress axis determines the fatigue stress.

9-172. Methods Used in the Preparation of Test Specimens. (Continued.) G. L. Smith. *Sheet Metal Industries,* v. 24, Nov. 1947, p. 2245-2247, 2262.

Notched-bar (Izod) test pieces; modified British Standard 18 test pieces from strip; miniature test pieces for high-temperature tensile tests; collar-type creep-test pieces for use with tension extensometer; miniature test pieces for tensile tests; and British Standard 18 strip test pieces from tubing. (To be continued.)

9-173. The Effect of Notching on Materials of Construction Under Static and Dynamic Tension. (Maximum Testing Velocity 29 Ft. Per Sec.) (Continued.) Georges Welter. *Metallurgia,* v. 36, Oct. 1947, p. 339-343; v. 37, Nov. 1947, p. 36-40.

Presentation of experimental data. (See item 9-149.)

9-174. A Simplified Warm Hardness Test for Temperatures Below 700° F. A. L. Pranses. *Instruments,* v. 20, Nov. 1947, p. 1006, 1066.

Simple apparatus for determining hardnesses of metals and other solid materials at elevated temperatures, using the Rockwell machine.

9-175. Measuring the Elastic and Plastic Properties of Wire. *Wire Industry,* v. 14, Nov. 1947, p. 617-618.

An instrument developed for the above purpose. (Condensed from report by J. Mickleraith, *Coil Spring Journal,* no. 8, Sept. 1947.)

9-176. High-Magnification Stress-Strain Charts. J. Orwig Jones. *Machinery (London),* v. 71, Nov. 6, 1947, p. 513-515.

Electronic high-magnification recorder to produce diagrams on a universal testing machine.

9-177. Testing Motor Brushholder Springs. *Steel,* v. 121, Dec. 1, 1947, p. 128.

Device developed by General Electric Co.

9-178. Hardness Testing With a Ball Trace. *Product Engineering,* v. 18, Dec. 1947, p. 124-126.

Construction and use of an instrument in which a ball is freely suspended and rolled at constant load over the specimen that moves on a slide beneath the ball at a specified velocity. Width and depth of the trace left by the ball on the specimen are used as an indication of Brinell hardness caused by cold rolling. The machine can also be used for testing variations in hardness as a function of time. (Translated and condensed from "Hardness Testing With a Ball Tracing Machine" by H. Hauttman, *Stahl und Eisen,* Sept. 2, 1943, p. 641.)

9-179. Testing the Strength of Magnesium Die Castings. Walter L. Fleischmann and George M. Stone, Jr. *Die Castings,* v. 5, Dec. 1947, p. 25-26, 40-42.

Physical properties of samples cut from castings produced by several die casters. Twenty magnesium castings were obtained from each of two sources making identical castings but different gating techniques, and 20 from a third foundry making a slightly different magnesium casting, but using the same gating technique as the first foundry. The test program was set up to show if any significant differences existed, first, between castings picked at random from one shipment; second, between sections within a casting; and, third, between castings produced by different die casters.

9-180. Creep and Creep-Rupture Testing. G. V. Smith, W. G. Benz, and R. F. Miller. *Steel,* v. 121, Dec. 8, 1947, p. 88-90, 106, 108.

Description of specimens, temperature controls, test stands, general procedures, and use of data. (Based on data presented at annual A.S.T.M. meeting, Atlantic City, N. J., June 1947.)

9-181. Correlation of Tension Creep Test With Relaxation Tests. *Journal of*

Applied Mechanics, v. 14 (*Transactions A.S.M.E.,* v. 69), Dec. 1947, p. A352-A355.

G. W. Housner presents solutions for several differential equations used in above paper by E. P. Popov. C. R. Soderberg suggests a more fundamental approach to the relaxation problem. Author's replies.

9-182. Methods Used in the Preparation of Test Specimens. (Concluded.) G. L Smith. *Sheet Metal Industries,* v. 24, Dec. 1947, p. 2444-2446, 2450.

Inspection of the test pieces.

9-183. How Processing Affects Bolt Fatigue Strength. N. B. Green. *Machine Design,* v. 19, Dec. 1947, p. 138-140.

Results of investigation of NAS high-strength steel bolts obtained by use of a hydraulic test machine designed to test three bolts simultaneously.

9-184. Le Facteur Dimension en Relation Avec les Proprietés Physiquès et Mecaniqués des Metaux. (The Dimensional Factor in Relation to the Physical and Mechanical Properties of Metals.) Winifred Lewis. *Revue de Metallurgie,* v. 44, March-April 1947, p. 122-123; discussion, p. 123.

Effects of dimensional variations of the samples on results of physical and mechanical testing.

9-185. Determination of Yield Point by the Method of Cone Penetration Using a Profilometer. F. F. Vitman and N. A. Zlatin. *Factory Laboratory (U.S.S.R.),* v. 13, Aug. 1947, p. 990-996. (In Russian.)

A new method of nondestructive determination of yield point based on the diameter of the circular boundry of plastic-deformation zone caused by penetration of the cone. This diameter was determined very exactly by means of a profilometer. The yield point determined by tensile testing was found to average 1.8 times greater than the yield point obtained by the above method for a series of steel specimens.

9-186. Fatigue Test of Leaf Springs and Torsion Shafts. L. I. Kukanov. *Factory Laboratory (U.S.S.R.),* v. 13, Aug. 1947, p. 997-1002. (In Russian.)

A new type of machine for testing leaf springs and torsion shafts was designed for a maximum load of 5000 kg.

9-187. Influence of Notches on the Cold Brittleness of Steel. Part I. Influence of the Shape of the Notch on Yield Point and Brittle Strength. E. M. Shevandino. *Journal of Technical Physics (U.S.S.R.),* v. 17, Sept. 1947, p. 1011-1018. (In Russian.)

Results of a study. A new theoretical interpretation proposed by the author. The notch effect is shown to be resolvable into four separate factors.

9-188. Fatigue at Very Low Temperatures. I. V. Kudriavtsev. *Engineer's Digest (American Edition),* v. 4, Nov. 1947, p. 541.

Machine developed for fatigue testing using notched and unnotched specimens in liquid air or liquid oxygen. Specimens of mild steel, chromium steel, and Cr-Ni steels were tested at 20, −75, and −193° C. In no case was there any reduction in fatigue limit at low temperatures. On the contrary, resistance to fatigue was greatly increased. However, resistance to fracture was five times smaller at −75° than at 20° C. (Translated and abstracted from *Zavodskaya Laboratoria,* 1946, p. 843-849.)

9-189. Fluidity Testing of Foundry Alloys. K. L. Clark. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. A54-A63; discussion, p. A64-A71.

Previously annotated in R.M.L., v. 3, 1946.

9-190. Control Tests for Gray Cast Iron; Report and Recommendations of Subcommittee T.S.6 of the Technical Council. *Proceedings of the Institute of British Foundrymen;* v. 39, 1945-1946, p. A28-A51; discussion, p. A64-A71.

34 references.

9-191. Standard Test Bars for the Nonferrous Foundry. Frank Hudson. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. A72-A78; discussion, p. A78-A88.

Previously annotated in R.M.L., v. 3, 1946.

9-192. The Measured Knoop Hardness of Hard Substances and Factors Affecting Its Determination. Newman W. Thibault and Helen L. Nyquist. *Transactions of American Society for Metals,* v. 38, 1947, p. 271-323; discussion, p. 323-330.

Previously annotated in R.M.L., v. 3, 1946, item 9-134.

9-193. Hardness Testing of Metals and Alloys at Elevated Temperatures. Frederick P. Bens. *Transactions of American Society for Metals,* v. 38, 1947, p. 505-545; discussion, p. 545-550.

Previously annotated in R.M.L., v. 3, 1946, item 9-133.

9-194. Influence of the Strain Rate and the Stress System on the Mechanical Properties of Copper. D. J. McAdam, Jr., G. W. Geil, and D. H. Woodard. *Transactions of American Society for Metals,* v. 38, 1947, p. 551-576.

Previously annotated in R.M.L., v. 3, 1946, item 9-54.

9-195. The Bend Test for Hardened High Speed Steel. Arthur H. Grobe and George A. Roberts. *Transactions of American Society for Metals,* v. 40, 1948, p. 435-471; discussion, p. 471-490.

See item 9-104.

9-196. A New Design of Microhardness Tester and Some Factors Affecting the Diamond Pyramid Hardness Number at Light Loads. R. F. Campbell, Q. Henderson, and M. R. Donleavy. *Transactions of American Society for Metals,* v. 40, 1948, p. 954-982.

New tester for loads ranging from 5 to 100 g. Over the range 225 to 900 D.P.H., measurements with loads of 50 and 100 g. agree well with a standard Vickers tester at loads of 10 and 30 kg. Below 50 g., the hardness number obtained with the microhardness tester decreases with decreasing load. Tests with two different penetrators, and also with a third penetrator in a similar tester, indicate that deviations from the specified geometry near the tip of the penetrator are largely responsible for the decrease in the hardness number. Effects of etching and some applications in measuring the hardness of the constituents of microstructures are shown.

9-197. Fatigue Tests of Major Aircraft Structural Components. W. G. Pierpont. *Proceedings of the Society for Experimental Stress Analysis,* v. 4, no. 2, 1947, p. 1-15.

Methods and equipment suitable for attacking the above problem. Tests conducted on the wing of a 4-place airplane of recent design.

9-198. A Method of Detecting Incipient Fatigue Failure. Henry W. Foster. *Proceedings of the Society for Experimental Stress Analysis,* v. 4, no. 2, 1947, p. 25-31.

One of the problems which arises in connection with all structural fatigue testing is the definition of failure, since it may require a considerable number of load cycles to propagate the initial microscopic fatigue crack to complete failure in tests of large and complicated specimens or in tests of large structural components. Quite extensive cracking may be present before appreciable changes in load-carrying capacity or deflection characteristics occur. A new method in which small insulated wires are cemented to the most critical areas to be inspected, failure being determined by rupture of the wires and consequent breaking of electrical circuits.

9-199. A Machine for Fatigue Testing Full-Size Parts. A. F. Underwood and C. B. Griffin. *Proceedings of the Society for Experimental Stress Analysis,* v. 4, no. 2, 1947, p. 32-38.

Machine developed by General Motors features high-load capacity (100,000 lb. or more); tension, compression, or push-pull loading; torsion loading up to 10,000 in-lbs.; dynamic strike (usually 0.165 in.); static stroke up to 2½ in.; rate of load application up to 2000 cycles per min.; follow-up of load during operation; and automatic operation.

9-200. Some Repeated Load Investigations on Aircraft Components. S. A. Gordon. *Proceedings of the Society for Experimental Stress Analysis,* v. 4, no. 2, 1947, p. 39-41.

Results of some work by Glenn L. Martin Co. indicate value of repeated-load testing as "accident insurance". This type of work was fully described in "Some Experimental Investigation on Repeated Load Tests on Aircraft Components", by F. D. Jewett and S. A. Gordon (v. 3, no. 1, p. 123-130).

9-201. Automotive Rear Axles and Means of Improving Their Fatigue Resistance. O. J. Horger and C. H. Lipson. *Symposium on Testing of Parts and Assemblies (American Society for Testing Materials),* 1947, p. 47-68; discussion, p. 69-75.

Eighty-eight axles were subjected to fatigue loading in rotating bending. These axles were made from N.E. 8650 steel, quenched and tempered to 388 to 444 Brinell. Seven different conditions were investigated for their influence on axle fatigue strength, including the effect of straightening, three degrees of shot-peening, and recarburization. 16 ref.

9-202. Report of Committee A-6 on Magnetic Properties. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 168-170.

Recommendations for changes in test methods. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

9-203. Report of Committee E-1 on Methods of Testing. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 470-475.

Recommendations for changes in the Standard Methods of Tension Testing of Metallic Materials (E8-42). Other recommendations and summaries of activities of technical committees. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

9-204. Pneumatic Fatigue Machines. F. B. Quinlan. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 846-850; discussion, p. 851; also *Symposium on Testing of Parts and Assemblies, (American Society for Testing Materials),* 1947, p. 41-45; discussion p. 46.

Machine developed by General Electric for testing of gas-turbine buckets. However the principles of this device are believed applicable to a wide variety of parts which are subject to reversed, bending stresses. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

9-205. A Study of the Damaging Effect of Fatigue Stressing on X4130 Steel. J. A. Bennett. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 693-710; discussion, p. 710-711.

The above effect was investigated with notched specimens. The damage was measured by the decrease in endurance at another stress. A deflection method for detecting the formation of fatigue cracks permitted the damage measurement to be limited chiefly to the pre-crack stage. Results showed that the apparent rate of damage depends on the stress history. Tests also were made with smooth specimens in an effort to determine the cumulative damage caused by fatigue at more than one stress. Two methods were developed for extrapolating to determine the point at which fatigue cracking starts for eight different damaging treatments. Using these curves, a method of expressing damage was developed which permits direct addition of damage occurring at different stresses. The reliability of this method was verified. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

9-206. Analysis of the State of Stress in the Neck of a Tension Test Specimen. N. N. Davidenkov and N. I. Spiridonova. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 1147-1158; discussion, p. 1175-1178. (Translated from the Russian.)

Results of a theoretical and experimental development of the distribution of stress in the smallest section of the neck of an elongated specimen. 10 ref.

9-207. A Study of the Tension Test. Earl R. Parker, Harmer E. Davis, and Alan E. Flanigan. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 1159-1174; discussion, p. 1175-1178.

Some experiments and analyses made to determine the nature of the fracture in mild-steel cylindrical tension bars over a considerable range in temperature, to study in the simple tension specimen, and to explain the fact that shear-type fractures originate in the central portion of tension-test specimens at normal temperatures. Shear fractures were distinguished from cleavage fractures by microscopic examination of fractured ferrite crystals using an etch-pit technique. An approximate analysis of the state of stress across the necked section of a tension bar just prior to rupture indicates that the shear stress reaches a maximum at the center of the necked section, corroborating the evidence from microscopic examination. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, June 1946.)

9-208. A Study of the Geometry of the Tension-Impact Specimen. N. A. Kahn and E. A. Imbembo. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 1179-1190; discussion, p. 1191-1197.

Data on the effect of geometry on energy values obtained from the above test indicate the effect of the L/D ratio of the test section on the tension-impact values; recommended values for this ratio in order to obtain a true measure of the tensile-impact resistance of metallic materials. Tension-impact data for medium steel; austenitic-type, corrosion-resisting steel; copper; Naval rolled brass; nickel-copper alloy (monel); and 17S-T aluminum alloy at various L/D ratios. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, June 1946.)

SECTION X

ANALYSIS

10-1. Modified Colorimetric Determination of Chromium in Ferrous Materials. Eugene H. Baker. *Foundry,* v. 75, Jan. 1947, p. 92, 182.

Modified Garratt and Mellan procedure. Metal is dissolved in a high-oxidizing acid and re-oxidized with a powerful oxidizing salt in aqueous solution. Filtrate is obtained and quickly measured, color reagent added, pH adjustment made, and measurement made using an electrophotometer or similar apparatus.

10-2. Rapid, Accurate, Economic Analysis of Iron and Steel by Means of the Spectrograph. Roy F. Lab. *Blast Furnace and Steel Plant,* v. 34, Dec. 1946, p. 1509-1514.

Equipment used at Copperweld Steel Co.; procedure in making an analysis; use of the spectrograph.

10-3. Operating Characteristics of the Sargent Model XX Visible Recording Polarograph. James J. Lingane. *Industrial and Engineering Chemistry (Analytical Edition),* v. 18, Dec. 1946, p. 734-738.

General characteristics of the Sargent-Heyrovsky visible recording polarograph. Performance of the instrument compared to that of other commercially available recording polarographs.

10-4. Crystallographic Techniques in Chemical Analysis. J. B. Nelson. *British Coal Utilisation Research Association Monthly Bulletin,* v. 10, Sept. 1946, p. 257-280.

Four different techniques; how they can be coordinated for best results in the study of difficult physico-chemical problems. 159 ref.

10-5. Electrographic Methods of Analysis. Eric A. Arnold. *Electrochemical Society Preprint* 90-37, 1946, 4 p.

In this technique, the specimen to be tested is made an anode in an electric circuit against an inert cathode, such as platinum, the electrolyte and necessary reagents being soaked into a piece of bibulous paper in intimate contact with both the anode and cathode. During flow of the current, the metals of the anode enter the paper and react with suitable reagents to form insoluble compounds.

10-6. Spectrochemische Analyse van Metaallegeringen Met Behulp van Emissiespectra. (Spectrochemical Analysis of Alloys by Means of Emission Spectra.) R. Schmidt. *Metalen,* v. 1, Nov. 1946, p 37-44.

Quantitative spectrochemical analysis by means of direct reading and photographic instruments with relative merits of each procedure. Survey of problems awaiting solution.

10-7. Extraction of Vanadium From Aqueous Acid Solutions by Isopropyl Ether. James J. Lingane and Louis Meites, Jr. *Journal of the American Chemical Society,* v. 68, Jan. 4, 1947, p. 2443-2447.

Optimum conditions for quantitative separation of ferric iron from vanadium by an isopropyl ether extraction

10-8. Polarographic Investigation of Oxalate, Citrate and Tartrate Complexes of Ferric and Ferrous Iron. James J. Lingane. *Journal of the American Chemical Society,* v. 68, Jan. 4, 1947, p. 2448-2453.

A photographically recording polarograph which has several advantages over commercially available instruments. The polarographic characteristics of ferric and ferrous iron in citrate, tartrate, and oxalate solutions were investigated, since these agents appeared to be most promising for determination of iron.

10-9. A Method for the Spectrochemical Determination of Germanium, Tin, and Lead in Ore Samples. Graham W. Marks and H. Tracy Hall. *Bureau of Mines Report of Investigations* 3965, Nov. 1946, 38 p.

After further research and development, the total-energy method of

spectrochemical analysis will be quite suitable for the general analysis of ore samples. Effects of various extraneous materials, particularly oxides, which enter into the formation of complex silicates, upon the intensities of characteristic lines.

10-10. The Polarographic Estimation of Antimony in Cable Sheathing Alloy B (B.S. 801). H. F. Hourigan. *Analyst,* v. 71, Nov. 1946, p. 524-527.

The lead alloy is hardened by use of 0.8 to 0.9% antimony. These limits are critical, hence composition must be carefully controlled. A polarographic method has been worked out

10-11. Magnesium in Aluminum. *Metal Industry,* v. 69, Dec. 20, 1946, p. 511.

Rapid analytical methods developed in Germany.

10-12. Nouvelle Methode de Determination de l'Oxygene dans le Fer et l'Acier. (A New Method for Oxygen Determination in Iron and Steel.) N. Vigna. *Helvetica Chimica Acta,* v. 29, no. 7, p. 1667-1669.

New method based on principle commonly used for determination of carbon in steel has accuracy of ±0.01%.

10-13. Alloy Steel Analysis. Quantitative Determination of Heavy Metal Oxinates. W. G. Cass. *Chemical Age,* v. 55, Dec. 7, 1946, p. 709-712.

Reviews the various procedures described in the literature.

10-14. Analysis of Gold and Gold Alloy Solutions. Edward A. Parker. *Monthly Review,* v. 34, Jan. 1947, p. 33-40.

Method as finally modified includes elimination of cyanides with hydrochloric and nitric acids; removal of excess nitrites with hypochlorite: neutralization to litmus endpoint with bicarbonate; addition of potassium iodide; and titration of the liberated iodine with arsenious oxide. The gold content of the sample size is of the order of 10 to 80 mg. Details of the final, approved procedure and the tests made.

10-15. Spectrographic Analysis. G. Stanley Smith. *Metal Industry,* v. 70, Jan. 10, 1947, p. 23-24.

Two or three of the circuits which have come or are coming into favor in Russia.

10-16. Recent Developments in Industrial Emission and Absorption Spectroscopy. *Journal of Scientific Instruments,* v. 23, Dec. 1946, p. 292-301.

Proceedings of Conference on Industrial Spectroscopy, London, 1946. 31 ref.

10-17. Magnetic Rotation of the Direct Current Arc in Spectrographic Analysis. A. T. Myers and B. C. Brunstetter. *Analytical Chemistry,* v. 19, Jan. 1947, p. 71. [Formerly *Industrial and Engineering Chemistry (Analytical Edition).*]

System results in consistent improvement in reproducibility.

10-18. A Rapid Method for the Analysis of Light Alloys, Based on Electrical Resistivity. L. Rotherham and J. I. Morley. *Journal of the Institute of Metals,* v. 73, Dec. 1946, p. 213-222.

Variation of electrical resistivity with composition in light alloys corresponding to the specifications D.T.D. 300 and 59A, in one case correlating resistivity with magnesium content and in the other with aluminum content. The results obtained depended on porosity, microstructure, and details of the casting procedure, but with careful control, a straight-line relationship between alloy content and resistivity can be obtained. Details of investigation and recommended procedure.

10-19. The Determination of FeO in Steel From the Carbon Drop. R. J. Sarjant. *Iron and Steel Institute Advance Copy,* Dec. 1946, 6 p.

Several forms of nomographs applicable to the determination of FeO in molten steel from the carbon drop. A variation of equilibrium temperature is included in a revised nomograph, calculated from the free-energy equation of Vacher and Hamilton. Some correlation was found with results of oxygen determinations reported by Bramley, Maddocks, and Tateson. A simple nomograph was also constructed for use at 1600° C. Reviews previous work on the determination of FeO in molten steel, and on the values of the velocity and equilibrium constants required for an accurate definition of the fundamental equation governing the reaction between FeO and carbon.

10-20. The Rapid Determination of Reactive Oxygen in Openhearth Steel. I. M. MacKenzie. *Iron and Steel Institute Advance Copy,* Dec. 1946, 5 p.

An experimental method of determining the reactive oxygen in liquid. Results correlate with the carbon content and the rate of carbon drop. A formula expressing the relationship is derived enabling the reactive oxygen, during the later stages of the boil, to be calculated or determined graphically from the carbon-drop curve.

10-21. The Colorimetric Estimation of Antimony in Aluminum Alloys Using Potassium Iodide and Thiourea. J. H. Bartram and P. J. C. Kent. *Metallurgia,* v. 35, Dec. 1946, p. 91-92.

Colorimetric method for the estimation of antimony in aluminum alloys shows very good agreement with the volumetric and polarographic methods; reproducibility of results is also

of a high order. The method is applicable to brass and bronze using a slightly different opening technique.

10-22. A Compound Method for the Absorptiometric Analysis of High and Super High Speed Steels. F. E. Eborall. *Metallurgia,* v. 35, Dec. 1946, p. 104-106.

Cobalt, chromium, vanadium, nickel, molybdenum and manganese are determined on one sample weight. Tungsten is separated, and the adsorbed molybdenum and vanadium separated along with the tungsten are determined. Other elements are determined utilizing modifications of previously published methods.

10-23. The History and Present Status of Emission Spectroscopy as Applied to Industry. Part III. John Convey. *Metallurgia,* v. 35, Dec. 1946, p. 107-110.

The photometry and calibration of spectrograms, and some of the efforts made to effect direct intensity measurements of spectral lines. In recent years spectral excitation methods have improved and photomultiplier tubes with greatly increased sensitivity have become commercially available.

10-24. 1:2-Cyclohexanedione-Dioxime ("Nioxime") as a Reagent for Nickel. W. C. Johnson and M. Simmons. *Analyst,* v. 71, Dec. 1946, p. 554-556.

Above compound has been investigated as a qualitative, gravimetric and colorimetric reagent for nickel and has been found to offer advantages except in gravimetric work. Colorimetric methods described.

10-25. The Determination of Mercury and Copper in Antifouling Compositions: Potassium Cobalticyanide as Complex-Forming Agent in Dithizone Technique. H. Barnes. *Analyst,* v. 71, Dec. 1946, p. 578-583.

Method using dithizone and sodium diethyldithiocarbamate. A simple wet ashing procedure described. Use of potassium cobalticyanide and a chloroform solution of dithizone for the elimination of interference due to copper (even when present in considerable excess) in the determination of mercury.

10-26. The "Bone and Wheeler" Gas-Analysis Apparatus. L. J. Edgcombe. *Fuel in Science and Practice,* v. 25, Nov-Dec. 1946, p. 163-166, 171-177.

The constant volume principle is used in the instrument described. In this type of apparatus, an unknown volume of gas is expanded to a fixed volume and the pressure measured. On removal of each constituent, the remaining gas is expanded to the original volume and the pressure measured. Advantages over the constant pressure type. The original Bone and Wheeler apparatus has been standardized as to dimensions to facilitate replacement of units. Drawings of the construction of the apparatus. 12 ref.

10-27. Influence of Iron on Induction of MoO_3 to MoO_2 During the Determination of Phosphorus. A. Malkov. *Journal of Applied Chemistry (U.S.S.R.),* v. 19, no. 5 and 6, 1946, p. 577-579. (In Russian.)

Colorimetric and oxidimetric methods may lead to erroneous results in the presence of iron.

10-28. Determination of Titanium Nitride in Ferro-Alloys. Louis Silverman. *Iron Age,* v. 159, Feb. 6, 1947, p. 68, 153.

Samples were prepared according to the procedure outlined and the residues analyzed by X-ray diffraction methods.

10-29. Use of Incompletely Consumed Samples to Illustrate Effect of Fractional Distillation in Carbon-Arc Spectrochemical Analyses. Lester W. Strock and George E. Heggen. *Journal of the Optical Society of America,* v. 37, Jan. 1947, p. 29-36.

It was hoped that a cut-off technique would permit use of beryllium as an internal standard. However, the data presented show that, while sufficient beryllium does participate in the arcing process to provide an intensity standard line, the cut-off point lies in a range where intensity ratios are changing so rapidly as to be poorly reproducible. However, the results do illustrate many basic features and sources of difficulty in d.c. carbon-arc spectrochemical analyses.

10-30. An Aliquot Procedure for Steel Analysis Using Colorimetric Methods. Henry Seaman and Wm. S. Levine. *Chemist Analyst,* v. 35, Dec. 1946, p. 78-80.

Results in considerable time saving in routine analysis of large numbers of steel samples.

10-31. Spectrographic Analysis of Zinc-Base Alloys. R. W. Smith and J. E. Hoagbin. *Analytical Chemistry,* v. 19, Feb. 1947, p. 86-92.

Method is applicable to routine control analysis of zinc-base die-casting alloys. Determinations can be made of tin, lead, cadmium and iron impurities, as well as of aluminum, copper and magnesium.

10-32. Determination of Nickel in Cobalt Steels and Alloys. Hyman Kirtchik. *Analytical Chemistry,* v. 19, Feb. 1947, p. 95-96.

A cyanide method has been found adequate for materials that may contain aluminum, beryllium, chromium, columbium, copper, iron, manganese, molybdenum, silicon, tantalum, titanium, tungsten, vanadium, or zirconium.

10-33. Colorimetric Determination of Titanium With Disodium—1, 2—Dihydroxybenzene—3, 5—Disulfonate. John H. Yoe and Alfred R. Armstrong. *Analytical Chemistry,* v. 19, Feb. 1947, p. 100-102.

The above reagent is sensitive to 1 part of titanium in 100,000,000 parts of solution when observations are made in 50-ml. tall-form Nessler cylinders. How to eliminate ferric ion interference. 11 ref.

10-34. Colorimetric Determination of Iron in Brass and Bronze. William Goodman. *Analytical Chemistry,* v. 19, Feb. 1947, p. 141-142.

Low results due to incomplete separation of iron have been reported. Method described eliminates this difficulty. Procedure is especially useful for silicon bronze.

10-35. The Chemical and Physico-Chemical Analysis of Iron and Steel; Five Years' Advancement. E. C. Pigott. *Metallurgia,* v. 35, Jan. 1947, p. 133-137.

An exhaustive and descriptive bibliography of contributions on ferrous analysis published during the period 1942-1946 inclusive. (To be continued.)

10-36. Modern Methods of Gas Analysis. Part I. W. D. Vint. *Metallurgia,* v. 35, Jan. 1947, p. 153-155.

The importance of accurate analyses, types of gases, and collection of samples.

10-37. Investigations on Colorimetric Methods of Metallurgical Analysis. Part II. G. V. L. N. Murty. *Metallurgia,* v. 35, Jan. 1947, p. 167-168.

A simple visual colorimetric procedure (standard series method) based on Vaughan's photoelectric method for the estimation of molybdenum in alloy steels. Results indicate that the new procedure, which is rapid and convenient for routine work, compares very favorably as to accuracy with the gravimetric and photoelectric methods.

10-38. Applications of Metallurgical Microchemistry to the Light Alloy Industry. Part II. Donald F. Phillips. *Metallurgia,* v. 35, Jan. 1947, p. 169-171.

Some of the problems handled by special microchemical laboratory. Equipment for handling this type of work. Adoption of various techniques in analytical field to micro scale.

10-39. Metallurgical Applications of the X-Ray Diffraction Spectrometer. Part III. John L. Abbott. *Iron Age,* v. 159, Feb. 27, 1947, p. 56-59.

Chemical analyses of an aluminum brazing flux and two stainless steel welding rod coatings in the form of diffraction patterns; the use of the X-ray diffraction spectrometer as compared with chemical and spectrographic analysis.

10-40. Quick Analyses of Magnesium Foundry Heats. F. R. Bryan and G. A. Nahstoll. *Materials & Methods,* v. 25, Feb. 1947, p. 90-92.

How direct reading spectrographic equipment is used by Ford to check, in a few minutes, all magnesium foundry heats before pouring.

10-41. Titration Method for Potential Soil Neutralizing Power of Blast Furnace Slags. C. J. Schollenberger. *Journal of the Association of Official Agricultural Chemists,* v. 30, Feb. 15, 1947, p. 117-124.

A modification of the usual method for determining the calcium carbonate equivalent of liming materials by acidimetric titration, whereby more accurate indications may be obtained in evaluating blast furnace slags.

10-42. The Determination of Hydrogen in Liquid Steel. J. E. Wells and K. C. Barraclough. *Journal of the Iron and Steel Institute,* v. 155, Jan. 1947, p. 27-32.

Five methods used for determination of the hydrogen content of liquid steel. They include use of a water-chilled mold, a cast-iron chill mold, and an ingot sample, in addition to the balloon-tube and notched-pencil methods. The best and simplest method for steel appears to be a modified pencil test in which the sample is taken as soon as possible from the mold and then quenched in water.

10-43. Nouvelle Méthode De Mesure Electrotitrimétrique. (New Method for Electrometric Titration.) P. Delahay. *Analytica Chimica Acta,* v. 1, Jan. 1, 1947, p. 19-32.

New method described permits direct measurements of the speed of evolution of electromotive force. Application of this technique permits more direct and accurate potentiometric, conductometric, and even amperometric titrations.

10-44. General Review of the Present Position of Quantitative Spectrographic Analysis. J. Gillis. *Analytica Chimica Acta,* v. 1, Jan. 1947, p. 38-49. (In English.)

76 references.

10-45. Nachweis von Scandium, Seltenen Erden, Zirkonium und Thorium mit Murexid. (Determination of Scandium, Rare Earths, Zirconium and Thorium Using Murexid.) G. Beck. *Analytica Chimica Acta,* v. 1, Jan. 1947, p. 69-71.

Reactions of scandium, the rare earths, zirconium, and thorium with murexid, a complex ammonium compound. A qualitative method for the detection of scandium with the same reagent. A titrimetric method for the determination of scandium with murexid and triacetic acid amine.

10-46. The Precipitation of Aluminum and Its Separation From Cobalt, Chromium, Nickel or Zinc by Means of Ammonium Benzoate. A. A. Smales. *Analyst*, v. 72, Jan. 1947, p. 14-16.

Optimum conditions were determined for precipitation of aluminum as benzoate. A single precipitation will give a practicable separation of 50 mg of aluminum from quantities of bivalent cobalt and hexivalent chromium up to at least 100 mg., but a double precipitation is desirable for similar amounts of bivalent nickel or zinc. The technique saves considerable time over usual methods, in which the other metals are removed from acid solution by electrolysis with a mercury cathode.

10-47. The Determination of Copper and Arsenic in Iron Pyrites by the Method of Internal Electrolysis. W. Cule Davies and Cyril Key. *Analyst*, v. 72, Jan. 1947, p. 17-21

New method previously applied to copper in steel was modified for pyrites. It is simple, direct, rapid, and accurate Details are given for determining arsenic in the presence of copper, and vice versa. The influence of other interfering elements.

10-48. 5-Hydroxyquinoline-8-Carboxylic Acid—A Colorimetric Reagent for Ruthenium. J. G. Breckenridge and S. A. G. Singer. *Canadian Journal of Research*, v. 25, Section B, Jan. 1947, p. 49-55.

Preparation and properties of 5-aminoquinoline-8-carboxylic acid and the 5-hydroxy compound, and use of the latter as a colorimetric reagent for ruthenium.

10-49. The Chemical and Physico Chemical Analysis of Iron and Steel. E. C. Pigott. *Metallurgia*, v. 35, Feb. 1947, p. 207-210.

Exhaustive descriptive bibliography of contributions on ferrous analysis published during the period 1942-1946 inclusive.

10-50. Volumetric Determination of Manganese by Titration With Permanganate in the Presence of Fluorides. V. M. Zvenigorodskaya and R. G. Gotsdiner. *Metallurgia*, v. 35, Feb. 1947, p. 223.

Disadvantages of the various volumetric procedures for determining manganese. (From *Zavod. Lab*, v. 12, 1946. p. 142, 152.)

10-51. Analysis of a Standard Sample of Natural Gas by Laboratories Cooperating With the American Society for Testing Materials. Martin Shepherd. *Journal of Research of the National Bureau of Standards*, v. 38, Jan. 1947, p. 19-51

A standard sample was analyzed by 30 cooperating laboratories using volumetric absorption and combustion techniques, in order to aid in the standardization of methods. Data are presented in a series of frequency distribution plots. Heating value and specific gravity determined by analysis are compared with Bureau of Standards determinations. Need for standardization.

10-52. Apparatus and Techniques for Practical Chemical Identification by X-Ray Diffraction. Charles S. Smith and Richard L Barrett. *Journal of Applied Physics*, v. 18, Feb. 1947, p. 177-191.

These methods are reviewed from the point of view of apparatus and techniques recently made commonly available, with particular emphasis on the use of long wave-length X-radiation. The discussion is designed especially for the person who wishes to make use of this important analysis tool but who is not an expert in X-ray diffraction. 16 ref.

10-53. Charts for Computation of d-Values in X-Ray Diffraction Chemical Analysis. Orley E. Brown. *Journal of Applied Physics*, v. 18, Feb. 1947, p. 191-198.

Charts for important iron, chromium, copper, molybdenum, and cobalt lines.

10-54. Carrier-Distillation Analysis of Uranium. *Chemical and Engineering News*, v. 25, March 17, 1947, p. 777.

A new spectrographic method which permits detection of 33 impurity elements, some in concentrations as low as a few tenths part per million, developed at the Bureau of Standards in 1942 for use by the Manhattan project.

10-55. Methode de Dosage du Cobalt. (Methods of Determination of Cobalt.) Jules Lamure. *Bulletin de la Société Chimique de France*, Nov-Dec. 1946, p. 661-663.

The formation of cobalt mercurithiocyanate is used for determination of bivalent cobalt

10-56. Simple Derivation of the Limiting Current With the Dropping Mercury Electrode by Dimensional Analysis. Oscar Kanner. *Electrochemical Society Preprint 91-10*, 1947, 3 p.

Except for a numerical constant, the formula for the limiting current in polarographic analysis is derived in an elementary and simple way by means of dimensional analysis, illustrating the general usefulness of this method.

10-57. Polarographic Determination of Vanadium in Steel and Other Ferro-Alloys. James J. Lingane and Louis Meites, Jr. *Analytical Chemistry*, v. 19, March 1947, p. 159-161.

Method described is based on removal of interfering elements by electrolysis with a mercury cathode from

a dilute sulphuric-phosphoric acid solution, and subsequent measurement of the anodic diffusion current produced by the oxidation of quadrivalent to pentavalent vanadium in a supporting electrolyte containing 0.5 to $3N$ sodium hydroxide and $0.1N$ sodium sulphite. Results obtained in analysis of ten Bureau of Standards samples were in excellent agreement with the Bureau's values. 11 ref.

10-58. Determination of Bismuth, Copper, and Lead in Aluminum Alloys. George Norwitz, Samuel Greenberg and Freda Bachtiger. *Analytical Chemistry,* v. 19, March 1947, p. 173-175.

Method described is much shorter than the method of the Aluminum Co. of America. Bismuth is determined colorimetrically as the iodide after precipitation as the oxychloride, and copper and lead are determined electrolytically from a nitric acid solution. 19 ref.

10-59. Apparatus for Anodically Stripping Electrodeposits From One Side of a Sheet for Analytical Purposes. J. W. Price. *Journal of Electrodepositors' Technical Society* (Reprint), v. 22, 1947, p. 22-23.

Apparatus devised to stop-off one side.

10-60. Om Elektriska Aggregat för Ljusalstring Vid Spektralanalys. (Spark and Arc Circuits for Spectrographic Analysis.) Georg Carlsson and Roland Rynninger. *Jernkontorets Annaler,* v. 131, no. 1 1947, p. 1-23.

A survey of different electric circuits used in spectrographic analysis. The two main groups are thoroughly analyzed and illustrated. A source-unit developed in Sweden on the basis of the above indicated circuits. 29 ref.

10-61. The Determination of Small Amounts of Aluminum by the Aurintricarboxylate Method. N. Strafford and P. F. Wyatt. *Analyst,* v. 72, Feb. 1947, p. 54-56.

In a paper published in 1943, the authors described a method for small amounts of aluminum and iron in water. This method was found to be inaccurate for determination of small amounts of aluminum in organic compounds. Modifications in procedure which eliminated the difficulties are described.

10-62. Infrared Absorption Analysis of Gases and Vapors. R. Quarendon. *Petroleum,* v. 10, March 1947, p. 54-55, 57.

First installment of a six-part article consists of a general introduction covering theoretical considerations and a brief description of limited and total radiation analyzers. (To be continued.)

10-63. Spectrochemical Analysis of High Copper in Cast Iron and Steel. W. R. Kennedy. *Journal of the Optical Society of America,* v 37, March 1947, p. 154-158.

A unique method which is suitable for copper in cast iron and steel up to 2.50%.

10-64. The Spectrochemical Analysis of Nickel Alloys. Edwin K. Jaycox. *Journal of the Optical Society of America,* v. 37, March 1947, p. 159-162.

A procedure for the analysis of nickel alloys for copper, iron, lead, magnesium, manganese, silicon, titanium, and zinc in the range 0.005 to 0.30% and for boron in the range 0.0003 to 0.03%.

10-65. A Study Concerning Characteristics of the High-Voltage A.C. Arc. E. A. Boettner and C. F. Tufts. *Journal of the Optical Society of America,* v. 37, March 1947, p. 192-198.

Investigation of eight factors and their effects on the reproducibility of intensity ratios of spectral lines when the high-voltage alternating-current arc is used as a source of excitation for quantitative spectrochemical analysis.

10-66. Slag Control by Routine Spectrographic Analysis. J. T. Rozsa. *Metal Progress,* v. 51, April 1947, p. 593-597.

Shows that above method will prevent three out of four of the expected off-analyses and high phosphorus heats. Direct-reading instruments enable analyst to make a complete steel or nonferrous analysis within two min., and a complete slag analysis in three min.

10-67. Setting-Up for Spectrographic Analysis. P. J. Gruszecki. *Iron Age,* v. 159, April 17, 1947, p. 44-46.

The fundamental concepts to be observed by a laboratory when installing a spectrograph unit. The effect of variation in barometric pressure in varying the slope of analytical curves is explored, substantiated with experimental data.

10-68. Modern Methods of Gas Analysis. Part II. W. D. Vint. *Metallurgia,* v. 35, March 1947, p. 255-257.

The Orsat gas-analysis apparatus and some hints on its correct maintenance. Particulars of the reagents used and the operation of the apparatus, including a graph indicating the number of cc. of gas which can safely be exploded when its calorific value is roughly known. (To be continued.)

10-69. Applications of the Polarograph to Metallurgical Analysis. Part II. G. W. C. Milner. *Metallurgia,* v. 35, March 1947, p. 265-267.

Three methods of separating copper and zinc, together with the reactions of other alloying elements generally

present in brasses and bronzes. Precipitation of zinc by sodium sulphide from an alkaline cyanide medium is recommended when the alloy contains a high percentage of nickel; otherwise potassium iodide is used. The zinc-sulphide precipitation method is recommended for brasses. For traces of zinc in bronzes the copper is more completely removed from the zinc by hydrogen sulphide. In all cases the zinc is finally determined polarographically using an ammonia-ammonium chloride base electrolyte.

10-70. A Note on the Use of Multi-Tip Electrodes in Polarographic Work. J. McGilvery, R. C. Hawkins, and H. G. Thode. *Canadian Journal of Research,* v. 25, section B, March 1947, p. 132-134.

Use of two or more capillaries in parallel to increase cathode surface and thereby increase diffusion current and sensitivity. Each tip gives a diffusion current proportional to its calibration constant, and multi-tip electrodes give diffusion currents proportional to the sum of the capillary constants. Galvanometer oscillations are also reduced considerably by use of multi-tip electrodes.

10-71. Sur une Cause d'Erreur dans la Méthode de Dosage par Fusion dans le Vide des Gaz Dissous dans l'Aluminium. (Concerning a Source of Error in the Vacuum-Fusion Method of Determining Gases Dissolved in Aluminum.) Léon Moreau and Georges Chaudron. *Comptes Rendus,* v. 224, March 17, 1947, p. 829-831.

A comparative investigation of the vacuum-fusion method and other gas-determination methods. The source of error seems to be in condensation of evaporated aluminum on the cold part of the apparatus followed by immediate absorption of this aluminum.

10-72. Emission Spectroscopy and Some of Its Industrial Applications. J. E. Scott. *Steel Proceessing,* v. 33, April 1947, p. 216-218.

Its use in qualitative and quantitative analysis.

10-73. New Titrimetric Methods for Thorium. Charles V. Banks and Harvey Diehl. *Analytical Chemistry,* v. 19, April 1947, p. 222-224.

A new oxidimetric method is based on the precipitation of thorium as the normal molybdate followed by the reduction and titration of the molybdenum equivalent to the thorium. This method has been applied to the separation of thorium from calcium and uranium and to the determination of molybdenum by reversal. A new electrometric titration method. 20 ref.

10-74. Colorimetric Method for the Determination of Cobalt Stainless Steel. Harry M. Putsche and W. Francis Malooly. *Analytical Chemistry,* v. 19, April 1947, p. 236-238.

Method uses Vogel's reaction in which a blue complex, sodium cobaltothiocyanate is formed on addition of sodium thiocyanate to a cobaltous solution. The intensity of the blue complex is measured colorimetrically.

10-75. Rapid Gravimetric Determination of Silicon in Aluminum Alloys. Philip Lisan and Henry L. Katz. *Analytical Chemistry,* v. 19, April 1947, p. 252-253.

Method suitable for amounts exceeding 1.5%. An acid attack is employed using phosphoric, nitric, and sulphuric acids. The precision and accuracy of the new method are determined by a statistical study of the data. 19 ref.

10-76. Second Annual Analytical Symposium. Sponsored by the Analytical Division, Pittsburgh Section, American Chemical Society. *Analytical Chemistry,* v 19, April 1947, p. 284-285.

Abstracts include the following papers: Polarographic Determination of Nickel. Application to Catalyst Material, by R. O. Clark; Phosphoric-Perchloric Acid Oxidation of Manganese, by Ernest Buyok; Analysis of Certain High-Temperature Alloys, by E. W. Beiter; Analysis With an X-Ray Spectrometer, by J. C. Redmond; Routine Spectrographic Analysis of Solders and Babbitts, by G. W. Wiener and A. W. Danko.

10-77. Spectrochemical Analysis by the Copper Spark Method. Mark Fred, Norman H. Nachtrieb, and Frank S. Tomkins. *Journal of the Optical Society of America,* v. 37, April 1947, p. 279-288.

A system in which 0.1 ml. of a hydrochloric acid solution of the sample is evaporated on the ends of a pair of flat-topped copper electrodes which are then excited in a spark. Absolute sensitivities for different elements ranging from 10^{-10} to 10^{-6} gr. have been obtained. The lower limits measurable by visual comparison with standard plates are given for 64 elements.

10-78. Evaluating Pickling Acid Inhibitors. E. L. Colichman, R. C. Thielke, and B. J. Cotey. *Iron Age,* v. 159, April 24, 1947, p. 55-57.

An easily performed colorimetric test method that has been successful in obtaining reproducibility to within 3% accuracy; and the analytical procedure to be followed in performing the evaluation test.

10-79. The Determination of Phosphorus in Austenitic Chromium-Nickel Steels. *Journal of the Iron and Steel Institute,* v. 155, March 1947, p. 373-391.

Important features of the recommended method are: a high nitric acid concentration to prevent the inhibiting effects of titanium and vanadium and to prevent formation of insoluble zirconium phosphate;

the recovery of occluded phosphorus in the presence of tungsten, columbium, and zirconium by precipitation of magnesium ammonium phosphate from ammoniacal solution, assisted by the addition of arsenate; elimination of arsenic and tin by treatment with hydrobromic acid.

10-80. Spot Tests for the Detection of Alloying Elements in Zinc-Base Alloys. B. S. Evans and D. G. Higgs. *Analyst,* v. 72, March 1947, p. 101-105.

Tests for the detection of copper, aluminum, antimony, tin, cadmium, and lead in zinc-base alloys.

10-81. Spot Tests for the Detection of Alloying Elements in Lead-Base Alloys. B. S. Evans and D. G. Higgs. *Analyst,* v. 72, March 1947, p. 105-109.

Tests for the detection of tin, antimony, cadmium, silver, arsenic, and bismuth in lead-base alloys.

10-82. The Titration of Minute Amounts of Nickel. B. S. Evans. *Analyst,* v. 72, March 1947, p. 110.

Modification of method published in v. 71, 1946, p. 457, which eliminated difficulty encountered with solutions containing less than 0.0001 g. Ni.

10-83. Modern Methods of Gas Analysis. Part III. Analysis of Blast-Furnace Gas. W. D. Vint. *Metallurgia,* v. 35, April 1947, p. 294-296.

Modified Orsat apparatus and the portable Orsat. The method of taking a flue-gas analysis. A brief description is given of the Hempel apparatus.

10-84. Applications of the Polarograph to Metallurgical Analysis. Part II. Polarographic Methods for the Determination of Zinc in Copper Base Alloys. (Continued.) G. W. C. Milner. *Metallurgia,* v. 35, April 1947, p. 307-309.

Precipitation method for determination of zinc in brasses.

10-85. Infrared Absorption Analysis of Gases and Vapors. Part II. R. Quarendon. *Petroleum,* v. 10, April 1947, p. 78-79, 89.

The general features of limited-radiation analyzers.

10-86. Lead in Zinc Alloys. F. L. Jameson. *Metal Industry,* v. 70, April 18, 1947, p. 272.

Method for routine determination to fine limits.

10-87. A New Scheme for the Microchemical Analysis of Ferrous Alloys. E. J. Vaughn and C. Whalley. *Journal of the Iron and Steel Institute,* v. 155, April 1947, p. 535-562.

Development of accurate microchemical methods of analysis for extremely small samples of steels and other ferrous alloys. Use is made of absorptiometric methods, whenever possible to complete the determinations. Chemical separations are reduced to the absolute minimum. Precise conditions for the individual determinations of the elements carbon, silicon, phosphorus, sulphur, manganese, nickel, molybdenum, chromium, vanadium, cobalt, copper, tungsten, titanium, and iron are given in full. 17 ref.

10-88. Super-Purity Aluminum. P. Urech. *Metal Industry,* v. 70, May 2, 1947, p. 303-304.

A colorimetric method for determination of element contents in very small amounts is recommended as a standard.

10-89. Rapid Determination of Tin in Copper-Base Alloys. M. Sherman. *Steel,* v. 120, May 19, 1947, p. 102.

Volumetric method employing modifications of Stanreduce. When set up for runs, the time for a determination is well under 25 min. For the amounts of tin usually found in copper-base alloys the results are within less than 0.05% of the true tin content.

10-90. Summary of Questionnaire on Time of Preliminary Tests. J. R. Pigott. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 65-67; discussion, p. 67.

Replies of 41 openhearth superintendents regarding the time required for preliminary tests for carbon, manganese, sulphur, phosphorus, and the common alloying elements in steel, using both chemical and spectrographic methods.

10-91. Colorimetric Determination of Phosphorus in Steels. Uno T. Hill. *Analytical Chemistry,* v. 19, May 1947, p. 318-319.

The colorimetric method of Kitson and Mellon is increased in accuracy and extended in scope by use of a blank which eliminates variables caused by temperature changes and differences in composition. A more rapid procedure using sodium molybdate and vanadate is applicable when vanadium is not present. 10 ref.

10-92. Tetraethylenepentamine as a Colorimetric Reagent for Copper. Thomas B. Crumpler. *Analytical Chemistry,* v. 19, May 1947, p. 325-326.

The blue color of the above reagent is independent of the amount of excess amine, is stable, and obeys the Beer-Lambert law. This amine is nonvolatile, practically odorless and colorless, and provides a color reaction with cupric ion which is about 3.5 times as sensitive as ammonia.

10-93. Determination of Metallic Aluminum in Aluminum Pigments. A. Keith Light and Loreen E. Russell. *Analytical Chemistry,* v. 19, May 1947, p. 337-338.

A volumetric procedure in which the dried powder is dissolved in an acid

solution of ferric sulphate in an atmosphere of carbon dioxide, and the resulting ferrous sulphate is titrated with standard potassium permanganate.

10-94. Colorimetric Determination of Antimony in Copper-Base Alloys. Albert C. Holler. *Analytical Chemistry*, v. 19, May 1947, p. 353-355.

The sample is dissolved in nitric acid and the antimony and tin hydrous oxides are filtered off and dissolved in sulphuric and hydrochloric acids. Antimony is determined by a colorimetric iodide method.

10-95. Polarographic Characteristics of Vanadium in Oxalate Solutions. James J. Lingane and Louis Meites, Jr. *Journal of the American Chemical Society*, v. 69, May 1947, p. 1021-1025.

The polarography of the several oxidation states of vanadium in oxalate solutions under various conditions. 13 ref.

10-96. Méthode d'Analyse Qualitative des Cations sans Séparations Systématiques. Caractérisations de: Arsenic, Etain, Antimoine, Bismuth. (Methods for Qualitative Analysis of Cations Without Systematic Separations. I. Qualitative Indication of Arsenic, Tin, Antimony, and Bismuth.) G. Charlot and D. Bézier. *Analytica Chimica Acta*, v. 1, March 1947, p. 113-123.

Results of work on improvement of the quantitative method according to which separations are reduced to a minimum, each metal being detected by an independent test. Special attention to detecting small percentages of the element.

10-97. Dosage Rapide du Chrome et du Vanadium. (Rapid Determination of Chromium and of Vanadium.) Lucien Ducret. *Analytica Chimica Acta*, v. 1, March 1947, p. 135-139.

The total chromium plus vanadium content is determined by direct titration in 2 to 3*N* sulphuric acid solution with a ferrous solution in the presence of sulphonated diphenyl amine as an oxidation-reduction indicator. Vanadium is titrated in the same solution after oxidizing by means of a slight excess of permanganate. After destruction of the excess of oxidizing agent with sodium azide, the titration is completed with the ferrous solution in the presence of the same indicator.

10-98. Analysis of Light Alloys Based on Electrical Resistivity. L. Rotherham and J. I. Morley. *Engineering*, v. 163, May 16, 1947, p. 416-418.

A satisfactory method for magnesium and aluminum in certain British aluminum and magnesium alloys, under circumstances in which spectrographic methods are not sufficiently accurate. (Condensed from paper presented to the Institute of Metals.)

10-99. A Review of Some Recent Applications to Spectrographic Analysis. J. H. Oldfield. *Journal of the Iron and Steel Institute*, v. 156, May 1947, p. 78-80.

Direct-reading methods use a phototube instead of a photographic plate for recording spectral-line intensities. Advantages A commercial instrument manufactured in the U. S.

10-100. Modern Methods of Gas Analysis. Part IV. The Ambler Portable Apparatus. W. D. Vint. *Metallurgia*, v. 36, May 1947, p. 47-50.

Technique and equipment for works model and precision model. Apparatus has simplicity and little possibility of gas leaks.

10-101. Amperometric Titration. Part III. Use of a Rotating Micro-Electrode. J. T. Stock. *Metallurgia*, v. 36, May 1947, p. 51-54.

This micro-electrode is particularly useful when dissolved oxygen does not interfere so that titration may be carried out in an open vessel.

10-102. A Method for Micro-Spectrography of Metals. Ford R. Bryan and George A. Nahstoll. *Journal of the Optical Society of America*, v. 37, May 1947, p. 311-316.

Qualitative spectrographic analyses of metallic areas of less than 0.05 mm. in diameter can be obtained by means of the equipment and methods described. The apparatus consists of a device for holding a counter electrode and the specimen to be analyzed; an electronic spark generator; and a medium quartz spectrograph. Minute areas such as inclusions, segregations, crystalline phases, surface contaminations, metallic platings, and the extent of metallic diffusion have been successfully analyzed.

10-103. Potentiometric Determination of Iron Using a "Comparative Electrode" (a Platinum-Ferric Ion Solution). Dushan Zhivanovich. *Journal of Applied Chemistry (U.S.S.R.)*, v. 19, no. 10-11, 1946, p. 1225-1230. (In Russian.)

Results using the Dickens-Thanheiser electrode—reported from Germany in 1932. A modified form of this electrode gave the most accurate results. The electrode described may also be used for the determination of chromium as chromate.

10-104. Determination of Manganese in Iron Ores. Esler R. Bechtel, Jr., and W. G. Crowle. *Chemist Analyst*, v. 36, Feb. 1947, p. 4-8.

Procedure using titration with arsenite-nitrite after oxidation by persulphate.

10-105. Microchemical Analysis. E. J. Vaughan and C. Whalley. *Iron and Steel*, v. 20, May 23, 1947, p. 269-275.

Details of a scheme for determination of various elements in ferrous alloys. 17 ref.

10-106. Cobalt Analysis. V. D. Ponomarev. *Metal Industry,* v. 70, May 30, 1947, p. 405.

Colorimetric determination in the presence of iron or nickel. (Translated and abstracted from *Journal of General Chemistry, U.S.S.R.*)

10-107. The Polarographic Determination of Tin in High-Purity Zinc and Zinc Die-Casting Alloys. R. C. Hawkins, D. Simpson, and H. G. Thode. *Canadian Journal of Research,* v. 25, Section B, May 1947, p. 322-330.

Procedure for the determination of tin in high-purity zinc and zinc die-casting alloys in amounts from 0.001 to 0.2%. The samples are dissolved in sulphuric acid, oxidized with hydrogen peroxide, precipitated with cupferron, redissolved and reduced, and finally the tin is determined polarographically. Accuracy is $\pm$ 2.0% for amounts less than 0.005%. 12 ref.

10-108. The Microchemical Determination of Molybdenum in Steel. J. E. Wells and R. Pemberton. *Analyst,* v. 72, May 1947, p. 185-188.

A colorimetric method for the determination of molybdenum in milligram quantities of steel. The method involves the use of toluene-3:4-dithiol in amyl acetate solution, and is virtually specific for molybdenum in steel.

10-109. A Method for the Determination of Tungsten in Steel, Using Toluene-3:4-Dithiol. The Removal of Molybdenum Interference by Selective Extraction. B. Bagshawe and R. J. Truman. *Analyst,* v. 72, May 1947, p. 189-193.

New method is applicable to a wide variety of alloy steels and provides the first satisfactory method for determining tungsten in percentages below 1.0%.

10-110. The Determination of Tin and Copper in Phosphor-Bronze. Brian B. Bach. *Metallurgia,* v. 36, June 1947, p. 65-66.

Methods are proposed in order to overcome difficulties introduced by the presence of phosphorus and are designed to give accurate results in reasonable time. Modifications are suggested to cover other copper alloys.

10-111. Determination of Small Amounts of Copper in Metallic Aluminum by Means of Internal Electrolysis. *Metallurgia,* v. 36, June 1947, p. 110.

Outlines work reported in *Zavodskaya Laboratoriya (U.S.S.R.)* in two papers (1941 and 1945).

10-112. Microchemistry in Great Britain and Belgium. A. Lacourt. *Metallurgia,* v. 36, June 1947, p. 101-103.

Wartime progress and techniques used at the Center of Microchemistry of the University of Brussels.

10-113. Examination of Absolute and Comparative Methods of Polarographic Analysis. John Keenan Taylor. *Analytical Chemistry,* v. 19, June 1947, p. 368-372.

Advantages and limitations of several methods of these two types. 24 ref.

10-114. Zirconium Determination in Presence of Interfering Elements. Charles A. Kumins. *Analytical Chemistry,* v. 19, June 1947, p. 376-377.

Method described entails the precipitation of zirconium with mandelic acid from a hydrochloric acid solution as a zirconium mandelate. It will separate it quantitatively from titanium, iron, vanadium, aluminum, chromium, thorium, cerium, tin, barium, calcium, copper, bismuth, antimony, and cadmium.

10-115. 2,2′-Bipyridine Ferrous Complex Ion as Indicator in the Determination of Iron. F. Wm. Cagle, Jr. and G. Frederick Smith. *Analytical Chemistry,* v. 19, June 1947, p. 384-385.

Above complex is suitable for use as an oxidation-reduction indicator in the determination of iron by cerate oxidimetry, following the use of sulphuric acid solutions with the Jones reductor for reduction of iron. Its preparation and advantages on a cost basis.

10-116. Determination of Carbon in Low-Carbon Steel. Charles E. Nesbitt and James Henderson. *Analytical Chemistry,* v. 19, June 1947, p. 401-404.

New apparatus and procedure for determining carbon content of plain and alloyed steels up to 0.05% carbon, with an accuracy of $\pm$ 0.0003%. Procedure requires about one hour and consists of burning a 2-g. sample in a stream of purified oxygen, collecting the CO_2 evolved in a special absorber containing a solution of NaOH, acidifying this solution, and measuring the CO_2 evolved.

10-117. Determination of Thorium and Its Separation From Uranium by Ferron. D. E. Ryan, W. J. McDonnell, and F. E. Beamish. *Analytical Chemistry,* v. 19, June 1947, p. 416-417.

A gravimetric method.

10-118. Determination of Oxygen in Steel by the Vacuum Fusion Method. Leroy Alexander, W. M. Murray, and S. E. Q. Ashley. *Analytical Chemistry,* v. 19, June 1947, p. 417-422.

A simplified apparatus and a modified operational plan. Relatively continuous operation is achieved, with consequent saving in analysis time. A method for the measurement of oxygen and hydrogen in surface films. 17 ref.

10-119. Analysis of Waste Pickle Liquor. R. D. Hoak. *Iron Age,* v. 160, July 3, 1947, p. 55-57.

Reliable methods for analysis of waste pickle liquors. Analysis procedures for manganese, zinc, and copper, as well as a rapid test for basicity of lime used for pickle-liquor disposal under any combination of temperature and reaction-time conditions.

10-120. Identification of War Steel Bar Stock. Part I. A. W. Ehlers. *Tool & Die Journal,* v. 13, July 1947, p. 76-78, 149, 150.

Spark testing.

10-121. Economic Method of Adapting Basic Spectrographic Equipment to Precision Quantitative Analysis. Philip H. Brotzman and Herman E. Hemker. *Steel,* v. 121, July 14, 1947, p. 83, 118, 121-122.

Methods developed by Parker Appliance Co. for inspection of forged and cast aluminum alloy aircraft parts.

10-122. Spectrographic Analysis of Stainless Steels. D. P. Jensen. *Iron Age,* v. 160, July 17, 1947, p. 47-48.

Improved method developed by Douglas Aircraft Co. is unique in its use of an internal standard which is not the matrix element iron but the sum total of all the metallic constituents of the specimen.

10-123. Colorimetric Determination of Small Amounts of Aluminum in Steel. N. K. Kuskova. *Journal of Analytical Chemistry (U.S.S.R.),* v. 2, no. 1, 1947, p. 7-16. (In Russian.)

Method permits determination of 0.005 to 0.15% Al in steel. Advantages over other colorimetric methods. 31 ref.

10-124. The Use of Diphenylthiocarbazone (Dithizone) in Analysis. Part II. Dissociation Constants of Zinc, Cadmium, and Lead Dithizonates. A. K. Babko and A. T. Pilipenko. *Journal of Analytical Chemistry (U.S.S.R.),* v. 2, no. 1, 1947, p. 33-42. (In Russian.)

Results of a study of the composition of the above compounds in CCl_4 solution, equilibria between the dithizonates and the metal salts at different pH and concentration values, and equilibria between the dithizonates and H_2S. Relationships between the dithizonates, sulphides, and the ammoniates of the respective metals.

10-125. Polarographic Determination of Zinc in Metallic Cadmium by Means of a Preliminary Separation of Cadmium Using Electrolysis and an Aluminum Cathode. P. N. Kovalenko and V. L. Dmitrieva. *Journal of Analytical Chemistry (U.S.S.R.),* v. 2, no. 2, 1947, p. 85-92. (In Russian.)

10-126. A Colorimetric Method for the Estimation of Small Amounts of Aluminum in Beryllium Salts. R. V. Mervel. *Journal of Analytical Chemistry (U.S.S.R.),* v. 2, no. 2, 1947, p. 103-110. (In Russian.)

Method described permits estimation of 0.002 to 0.5% Al by formation of the oxyquinolate. Time of determination is 1 to 1½ hr. 10 ref.

10-127. Separation of Cerium From the Rare Earth Metals by the Bromate-Pyridine Method. E. A. Ostroumov. *Journal of Analytical Chemistry (U.S.S.R.),* v. 2, no. 2, 1947, p. 111-117. (In Russian.)

Formation of tetravalent cerium in the form of the basic bromate. Conditions for quantitative separation by means of pH regulation using a mixture of pyridine-HCl salts. The method is claimed to be applicable in analytical chemistry and also in obtaining pure cerium compounds. 15 ref.

10-128. Behavior of Rhodium During Polarographic Analysis. S. A. Repin. *Journal of Applied Chemistry (U.S.S.R.),* v. 20, no. 1 and 2, 1947, p. 46-54. (In Russian.)

A series of complex compounds of rhodium were investigated to determine the possibility of polarographic determination of the metal.

10-129. Determination of Rhodium in the Presence of Iridium and Platinum by Means of a Polarographic Method. S. A. Repin. *Journal of Applied Chemistry (U.S.S.R.),* v. 20, no. 1 and 2, 1947, p. 55-62. (In Russian.)

Method permits determination with an error of not more than 2 to 3% of the amount present, 0.001 g. in one liter of solution being easily determined. Time of determination is approximately 1 hr. 7 ref.

10-130. Copper in Aluminum Alloys. L. E. Vvedenski. *Metal Industry,* v. 71, July 4, 1947, p. 9.

Certain improvements in the spectrographic technique which are claimed to result in greatly improved accuracy. (Condensed from *Zavodskaya Laboratoriya.*)

10-131. Use of the Spectroscope in the Determination of the Constituents of Boiler Scale and Related Compounds. Alton Gabriel, Howard W. Jaffe, and Maurice J. Peterson. *American Society for Testing Materials Preprint 116,* 1947, 6 p.

10-132. Determination of Lead in Presence of Barium, Strontium, Calcium and Magnesium. Part III. V. P. Shvedov. *Journal of General Chemistry (U.S.S.R.),* v. 17, no. 1, 1947, p. 33-38. (In Russian.)

Formation of the oxy-chloride, followed by its solution in ammonium acetate, and subsequent precipitation as lead chromate.

10-133. Report on Standard Samples for Spectrochemical Analysis. *American Society for Testing Materials, Technical Publication No. 41-B,* 1947, 23 p.

Standard samples for iron and steel; aluminum and its alloys; magnesium and its alloys; zinc, lead, tin, and copper alloys; and miscellaneous material available from the U. S. Bureau of Standards and various companies.

10-134. Spot-Etching Apparatus for Light Metals. Ulsamer, Egler and Trocke. *Headquarters Air Materiel Command, Wright Field, Translation F-TS-1863-RE,* May 1947, 2 p.

Simplified apparatus for identification of various light metals. Its use on a number of samples. (From *BMW Flugmotorenbau G.m.b.H.,* Aug. 1943.)

10-135. En Undersokning av Fotografiska Platar fur Spektralanalys. (Investigation of Photographic Plates for Spectrochemical Analysis.) Per Spiegelberg. *Jernkontorets Annaler,* v. 131, no. 5, 1947, p. 181-191.

A series of photographic plates of different brands were investigated to determine the contrast and deviation from average density due to the grain. A formula is proposed for computation of these values. Density fluctuations due to grain are independent of the wave length.

10-136. Bestamning av Kisel och Kiselsyra med Gelatin-Metoden. (Determination of Silicon and Silica by the Gelatine Method.) Erik Hammarberg. *Jernkontorets Annaler,* v. 131, no. 6, 1947, p 199-211.

The gelatine method—precipitation of silica in an acid solution by the addition of gelatine—for the determination of silicon in pig iron, steel and some ferro-alloys, as well as silica in silicates, gives as correct results as dehydration methods. Time required for the gelatine method is much shorter than for the older dehydration method.

10-137. Spectrochemical Determination of Lithium, Sodium, and Iron in Lithium-Bearing Ores. George Oplinger. *Analytical Chemistry,* v. 19, July 1947, p. 444-447.

A quantitative method with a precision of ± 1 to 2% for the lithium oxide determination. 15 ref.

10-138. Use of Convection Effects in Gas Analysis by Thermal Conductivity. Clarke C. Minter. *Analytical Chemistry,* v. 19, July 1947, p. 464-465.

Analyzing a ternary mixture of gases by comparing its thermal conductivity with that of a binary mixture of known composition and then comparing the effect of pressure on convection for the two mixtures. While the mixtures investigated consisted only of H_2, CO_2 and CH_4, the method should be applicable to other combinations of gases that do not react chemically with each other.

10-139. Device for Estimating the Height of Polarographic Waves. John Keenan Taylor. *Analytical Chemistry,* v. 19, July 1947, p. 478-480.

Simple device can be used for measuring diffusion currents by either graphical or exact methods.

10-140. Unitized Mercury Cathode Apparatus for Electrolytic Removal of Metals. Hilton O. Johnson, J. R. Weaver, and Louis Lykken. *Analytical Chemistry,* v. 19, July 1947, p. 481-483.

Apparatus consists of a self-contained immersion electrode assembly coupled to a high-capacity Tungar rectifier and a suitable control panel. It removes approximately 0.5-gram quantities of copper, iron, nickel, cobalt, chromium, zinc, and many other elements in one hour or less from an acidic solution. It also removes interfering elements prior to polarographic analysis for aluminum, sodium, potassium, and other metals not removed by electrolysis with a mercury cathode. 12 ref.

10-141. Colorimetric Determination of Cobalt Using Nitroso-R Salt. Hobart H. Willard and Samuel Kaufman. *Analytical Chemistry,* v. 19, July 1947, p. 505.

Experiments indicate superiority of a blue-filter for this determination.

10-142. Spectrochemical Determination of the Major Constituents of Minerals and Rocks. Aslak Kvalheim. *Journal of the Optical Society of America,* v. 37, July 1947, p. 585-592.

A method using the a.c. carbon arc is described for the spectrochemical determination of Si, Na, K, Al, Ca, Mg, Fe, and Mn in minerals, rocks, slags, and related substances. The determination of Ti is also discussed.

10-143. Spectrographic Analysis of Zinc and Lead. J. Morris. *Canadian Chemistry and Process Industries,* v. 31, July 1947, p. 665-666, 669-670.

Methods used at Consolidated Mining and Smelting Company, Ltd., Trail, B. C.

10-144. Proximate Analysis of Furnace Gases. G. A. Burgvits and G. S. Iakovlev. *Boiler and Turbine Construction (U.S.S.R.),* Feb. 1947, p. 32. (In Russian.)

Use of a platinum catalyst at 450° and equations for calculation of the heat content of hydrocarbon mixtures from the analytical data.

10-145. Separation du Nickel et du Cobalt dans le Microdosage du Cuivre par le di-Ethyl-di-thiocarbamate. (Separation of Nickel and Cobalt in the Micro-

determination of Copper by Diethyldithiocarbamate.) H. Cheftelo, J. Bail, R. Fouasson and P. Clavie. *Bulletin de la Société Chimique de France*, March-April 1947, p. 311-313.

Nickel is eliminated by chloroform extraction of the water-insoluble compound formed in the reaction with dimethylglyoxime. With the same reagent cobalt gives a water-soluble complex which removes that element by the carbamate reaction. Quantities of copper of the order of 0.025 mg. may be determined within 0.001 mg. in samples of several mg. to 1 kg.

10-146. Emploi du Stannochlorure de Potassium Dihydraté dans le Dosage Volumétrique du Vanadium et du Molybdène. (Use of Dehydrated Potassium Chlorostannate in Volumetric Determination of Vanadium and Molybdenum.) Tryphon Karantassis and Catherine Stathi. *Comptes Rendus*, v. 224, June 2, 1947, p. 1564-1566.

Data support the claim that the method is far more accurate than those previously described.

10-147. A New Method of Spectrographic Analysis. R. Ricard and A. Cornu. *Engineers' Digest (American Edition)*, v. 4, July 1947, p. 311-312.

In order to directly compare lines of unknown concentration in a sample with similar lines of a calibrated standard sample, the normal spectrograph slit has been replaced by a reflecting cylinder of small diameter. When illuminated, the virtual focus of the cylinder supplies a ray which can be used without a slit. The light source can then be arranged outside the collimator axis and one can then utilize two light sources at the same time. The spectra of a standard and of an unknown sample can therefore be projected onto the same part of a photographic plate. (Translated and condensed from *Revue de Metallurgie*, v. 42, Dec. 1945, p. 389-392.)

10-148. The Economic Significance of Direct Reading Spectrochemical Analysis. M. F. Hasler. *Iron Age*, v. 160, Aug. 14, 1947, p. 71-73.

Various metal producing capacity classifications are considered from the standpoint of savings in operating costs and laboratory costs, since advantages of high speed analysis are related, to some degree, to plant size. The high degree of composition control results in substantial reductions in scrap losses.

10-149. Polarographic Determination of Zinc in Aluminum Alloys. W. Stross. *Metallurgia*, v. 36, July 1947, p. 163-166.

An improved modification of a method previously published. An alternative technique is based on the same principle, but does not require the use of a centrifuge. It includes a modification on the semi-micro to micro scale. Routine method of determining zinc in aluminum alloys. (To be continued.)

10-150. Deux Réactions d'Identité, Très Sensibles, de l'Aluminium et de l'Etain Métalliques. (Two Very Sensitive Identification Reactions of Metallic Aluminum and Tin.) Georges Deniges. *Comptes Rendus*, v. 224, June 30, 1947, p 1799-1801.

Certain mercury salts are used to determine minute quantities of aluminum and tin. Accurate determinations have been made with as little as 0.2 mg. of metal.

10-151. Direct Colorimetric Method for Phosphorus in All Types of Steel. Henry L. Katz and Kenneth L. Proctor. *Analytical Chemistry*, v. 19, Aug. 19, 1947, p. 612-614.

How Hague and Bright's method for the colorimetric determination of phosphorus in steel and cast iron has been modified to eliminate interferences incurred with high-chromium, columbium, and tungsten steels.

10-152. Contribution to the Study of an Inorganic Semiquantitative Method of Analysis: Analysis of Chromium and Nickel. Paul E. Wenger, D. Monnier and Y. Rusconi. *Analytica Chimica Acta*, v. 1, June 1947, p. 190-200. (In English.)

Dilution of a known solution of the desired element determines the limit of sensitivity of the reagents. By calculation from the values obtained, tables can be established which give directly the percentage of the limit being determined. Procedure as applied to the determination of chromium, nickel, bismuth, molybdenum and manganese.

10-153. Sur Une Stilliréaction du Cobalt. (A Spot Reaction for Cobalt.) Clément Duval. *Analytica Chimica Acta*, v. 1, June 1947, p. 201-204.

A microchemical test for cobalt. The spot test is satisfactory even in the presence of nickel, and is applicable in the presence of other ions of the cobalt group.

10-154. Note Sur la Stilliréaction du Cobalt Sous Forme d'Hexanitritocobaltate (III) de Potassium. (Note Concerning a Spot Reaction for Cobalt in the Form of the Hexanitritocobaltate (III) of Potassium. Clément Duval and Colette Soye. *Analytica Chimica Acta*, v. 1, June 1947, p. 205-206.

Conditions for micro-analytical detection of cobalt. Absolute sensitivity is 0.04μg. Nickel does not interfere.

10-155. Analytical Methods of Investigating Some Highly Refractory Carbides and Nitrides. (SiC, B_4C, BN) (Project

No. KQ-253). Hans Bielstein. *Headquarters Air Materiel Command Technical Report No. F-TR-1154-ND GS-AAF-Wright Field No. 34,* Aug. 1947, 14 p.

Special methods for the exact quantitative analysis of silicon carbide, boron carbide, boron nitride, and their common impurities used in the analytical laboratory of the Electro-Schmelzwerk, Kempten-Allgaeu.

10-156. Application of a Geiger-Muller Counter to Chemical Analysis at Low Concentrations of Elements in Different Materials. N. D. Borisov and Ia. M. Fogel. *Journal of Technical Physics (U.S.S.R.),* v. 17, no. 5, 1947, p. 599-612. (In Russian.)

The intensity of monochromatic X-ray radiation and the number of pulses of a Geiger counter are directly proportional to each other. This fact led to the development of a method for qualitative and quantitative determination of small concentrations of elements. It is useful for nondestructive analysis of beryllium foil and bronze ribbon, and for the presence and amount of iron, zinc, copper, and silver impurities. 12 ref.

10-157. The Spectrographic Analysis of Ferrosilicon. J. H. Coulliette. *Journal of the Optical Society of America,* v. 37, Aug. 1947, p. 609-613.

A method for the spectrographic analysis of materials consisting of two or more components. Application to the analysis of ferrosilicon. Eliminates necessity for adding a standardizing material to the sample or making approximations to correct for reference element dilution.

10-158. Direct-Reading Device Provides Rapid Steel Analysis. E. R. Vance. *Steel,* v. 121, Sept. 22, 1947, p. 92, 94.

Spectrometer instrumentation which produces a quantitative analysis report for eight elements within 40 sec. after the sample is placed in the electrode holders. Results are reported to the melt shop in 5 to 6 min. after the test is taken.

10-159. Polarographic Determination of Zinc in Aluminum Alloys. (Concluded.) W. Stross. *Metallurgia,* v. 36, Aug. 1947, p. 223-225.

Three methods for determining zinc.

10-160. Report on Cadmium. A. K. Klein. *Journal of the Association of Official Agricultural Chemists,* v. 30, Aug. 1947, p. 455-456.

Additional results obtained using method previously described for Cd in the range 0 to 25 mmg. (Volume 28, 1945, p. 257.)

10-161. Mobile Laboratory Speeds Steel Analysis. H. A. Tuttle and G. A. Nahstoll. *Iron Age,* v. 160, Sept. 25, 1947, p. 68-72.

Mobile laboratory at Ford Motor Co. Rouge plant permits applications of analytical control heretofore impossible. The equipment, analytical methods, and important applications. Specialized spectroscope used for semi-quantitative analysis of steel. 12 ref

10-162. Determination of Fluorine in Metallic Preparations. Iu. A. Chernikhov and E. I. Vendel'shtein. *Factory Laboratory (U.S.S.R.),* v. 13, July 1947, p. 815-816. (In Russian.)

A special method involving fusion with Na_2CO_3, suitable for the zirconates, which often have to be analyzed in connection with the production of metallic zirconium.

10-163. The Separation of Titanium From Aluminum and Iron, Using Fluorides. Sh. T. Talipov and Z. T. Sofeikova. *Factory Laboratory (U.S.S.R.),* v. 13, July 1947, p. 816-819. (In Russian.)

Method is based on the greater solubility of Na_2TiF_6 in comparison with Na_3AlF_6 and Na_3FeF_6.

10-164. An Electrical Device for the Transfer of Samples During Spectroscopic Analysis. H. S. Sventitskii and K. I. Taganov. *Factory Laboratory (U.S.S.R.),* v. 13, July 1947, p. 850-853 (In Russian.)

Method and apparatus are based on the principle of electrical erosion recently applied to machining in the U.S.S.R. A definite amount of the material of the specimen to be analyzed is transferred to a fixed electrode by electro-erosion, then the specimen electrode is replaced by another one like the fixed one. An arc is struck, and the time during which the characteristic lines of the element being determined are visible is considered to be proportional to the percentage composition.

10-165. Apparatus for Rapid Determination of Hydrogen in Steel. V. Ia. Dubovoi and V. A. Romanov. *Factory Laboratory (U.S.S.R.),* v. 13, July 1947, p. 883-884. (In Russian.)

Details of construction and operation of apparatus. It is claimed to be more suitable for industrial use than previously described equipment because of greater simplicity of construction and rapidity of analysis.

10-166. Spectrographic Determination of the Content of Arsenic in Steel. O. I. Nikitina. *Factory Laboratory (U.S.S.R.),* v 13, July 1947, p. 885. (In Russian.)

Details of the method used including typical results and a chart for determining the arsenic concentration from the spectral measurements.

10-167. Sorting of Pig Iron According to Silicon Content by Means of a Thermoelectric Instrument. A. V. Golovin. *Factory Laboratory (U.S.S.R.),* v.

13, July 1947, p. 886-887. (In Russian.)

It was found that pig scrap containing 0.17 to 0.37% Si produced a negative galvanometer deflection, as compared with a positive deflection for higher contents. It was also found possible to approach very closely to true Si analyses by use of the instrument, the circuit of which is given. Results for a long series of steels with varying Si contents.

10-168. Spectrographic Analysis; Brass and Bronze Ingot Production. G. E. Staahl and G. P. Halliwell. *American Foundryman,* v. 12, Sept. 1947, p. 51-57.

The use of the spectrograph in the production of copper-base foundry ingots. Among the applications discussed are the control of furnace production, the analysis of scrap and stock materials, the sorting of metals, the analysis of samples from outside sources, and use as a qualitative aid to the chemical department.

10-169. Spectrographic Examination of Organic Precipitates; Nickel Dimethylglyoxime. Margaret Griffing, Thos. De Vries, and M. G. Mellon. *Analytical Chemistry,* v. 19, Sept. 1947, p. 654-655.

Separation of Ni from seven times its weight of Sb, As, Ba, Cd, Ca, Mg, K, Na, St and Zn was obtained by precipitation with dimethylglyoxime. Al, Cr, Cu, and Mn were definitely coprecipitated. The error introduced by the Cr and Mn was insignificant.

10-170. Improved Dithizone Method for Determination of Lead; Mixed-Color Micromethod at High pH. L. J. Snyder. *Analytical Chemistry,* v. 19, Sept. 1947 p 684-687.

New procedure based on extraction of lead from aqueous solution at pH 11.5. A saving in time and an improvement in convenience and flexibility are claimed. 18 ref.

10-171. Stable Colorimetric Reagent for Chromium. J. F. Ege, Jr., and Leslie Silverman. *Analytical Chemistry,* v. 19, Sept. 1947, p. 693-694.

In a modification of the S-diphenyl carbazide reagent for the colorimetric determination of hexavalent chromium, the major change is the substitution of phthalic anhydride for the acidic constituent. The resulting reagent is stable for weeks. Its use results in a simplified analytical procedure.

10-172. A New Differential X-Ray Absorption Method for Elementary Chemical Analysis. A. Engstrom. *Review of Scientific Instruments,* v. 18, Sept. 1947, p. 681-682.

Simple apparatus for microchemical analysis by X-ray absorption spectrography of either thin metal foils, sections of biological tissues, or substances in the form of dry powders or aqueous solutions.

10-173. Direct-Reading Spectrometer for Ferrous Analysis. R. O'B. Carpenter, E. DuBois, and J. Sterner. *Journal of the Optical Society of America,* v. 37, Sept. 1947, p. 707-713.

Modification of spectrometer described by Saunderson, Caldecourt, and Peterson. Data on reproducibility of analytical results obtained for Ni, Cr, Si Mn, Cu, Mo, Al, and Sn in steel. Errors introduced are shown to be small.

10-174. L'Analyse Chimique Par Spectrographie D'Emission. (Chemical Analyses by Spectrographic Emission.) E. Loeuille. *Metaux et Corrosion,* v. 22, March 1947, p. 38-45.

Present state of spectrographic analysis in France. Apparatus and methods used. (To be continued.)

10-175. The Spectrographic Analysis of a Complex Ferrous Alloy. C. H. R. Gentry and G. P. Mitchell. *Journal of the Society of Chemical Industry,* v. 66, July 1947, p. 226-232.

Procedure for the analysis of "Ticonal" alloy, a complex ferrous material. To permit the accurate determination of the high-percentage constituents, a concentration-ratio method is used which allows for variations in the content of iron. A modification of the calculating board is suggested to simplify the clerical work involved. The precision of the spectrographic method is shown to compare favorably with that obtainable by routine chemical methods. Suggestions for the accurate spectrographic analysis of any complex material containing high-percentage constituents. 16 ref.

10-176. Applications de la Chromatographie a la Séparation des Métaux Nobles. (Applications of Chromatography to the Separation of Noble Metals.) René Dubrisay. *Comptes Rendus,* v. 225, Aug. 4, 1947, p. 300-302.

Pulverized carbon is put into a glass tube, and a liquid containing silver nitrate and nitrates of other metals in definite proportions is added. Metallic silver separates out, the carbon is dried and then attacked by nitric acid. Analysis for the metals may then be made.

10-177. The Use of Potassium Ethylxanthogenate for Quantitative Estimation of Zinc and Cadmium. M. T. Berkovich. *Journal of Analytical Chemistry (U.S.S.R.),* v. 2, July-Aug. 1947, p. 215-218. (In Russian.)

Method of indirect potentiometric titration of zinc and cadmium ethylxanthogenates and a method for

quantitative separation of cadmium from zinc.

10-178. A Quantitative Spectroscopic Estimation of Cobalt and Nickel by Utilizing the Spectrogram Background Radiation. L. N. Ovchinnikov. *Journal of Analytical Chemistry (U.S.S.R.),* v. 2, July-Aug. 1947, p. 225-228. (In Russian.)

Application to estimation of Co and Ni in copper ores.

10-179. Spectral Analysis of Microscopic Inclusions, Coatings, and Precipitates. S. A. Baravie and L. N. Indichenko. *Journal of Analytical Chemistry (U.S.S.R.),* v. 2, July-Aug. 1947, p. 229-230. (In Russian.)

Methods developed for introduction of microsamples into the carbon electrode, by which 8×10^{-9} g. of silver, 9×10^{-9} g. of copper, and 10×10^{-9} g. of iron have been determined.

10-180. The Use of Dry Reagents for Analysis of Ores and Minerals in Field Conditions. N. S. Poluektov and M. P. Nikonova. *Journal of Analytical Chemistry (U.S.S.R.),* v. 2, July-Aug. 1947, p. 236-238. (In Russian.)

Use of dry reagents for the detection of boron, vanadium, nickel, antimony, and chromium using spot reactions.

10-181. Determination of Impurities in Volatile Metals by Vacuum Distillation. M. Villat. *British Chemical Digest,* v. 1, Sept. 1947, p. 461, 463, 465.

Equipment and procedure. Three modifications which have been used for analysis of Ca, Mg, Cd, Zn, and alkali metals; brasses; and aluminum. Typical results for aluminum. (Translated from thesis presented to L'Ecole Polytechnique Federale, Zurich.)

10-182. Gravimetric Determination of Sulphur in Bronze and Other Nonferrous Alloys With Ferric Chloride Reagent; Qualitative X-Ray Diffraction Examination of Residue. Louis Silverman and William B. Goodman. *Chemist-Analyst,* v. 36, Sept. 1947, p. 28-33.

Ferric chloride reagent compared with cupric potassium chloride as a gravimetric reagent for sulphur. Its advantages in the case of bronze and metallic copper. Possible use in the determination of the composition of nonferrous furnace metals. X-ray diffraction patterns of the ferric chloride and the cupric potassium chloride residues show that sulphur remains as cuprous sulphide and elementary sulphur.

10-183. Determination of Lead in a Graphite-Lead-Tungsten Ore. H Sharples. *Chemist-Analyst,* v. 36, Sept 1947, p. 40-41.

It was found necessary to remove tungsten before determining lead by the routine molybdate method.

10-184. Colorimetric Determination of Aluminum in Zinc-Base Die-Casting Alloys. Milton Sherman. *Die Castings,* v. 5, Oct. 1947, p. 23, 42-44.

Method uses alizarin red S as indicator. Accuracy is stated to be ±0.05%

10-185. The Analysis of Nickel-Cobalt-Iron Alloys Used in Glass-to-Metal Seals. R. C. Chirnside, H. J. Cluley, and P. M. C. Proffitt. *Analyst,* v. 72, Aug. 1947, p. 351-359.

Methods for the accurate determination of nickel, cobalt, iron, and manganese in low-expansion alloys used for glass-to-metal seals. Duplicate analyses of a number of commercial alloys. The nature and formation of the Fe-Co-dimethylglyoxime complex. 10 ref.

10-186. Study of Alloxane and Some of Its Derivatives as Analytical Reagents. Leonid Kul'berg. *Journal of General Chemistry (U.S.S.R.),* v. 17(79), June 1947, p. 1089-1098. (In Russian.)

The mechanism of the Denige reaction with heavy metals. The analytical properties of several derivatives of alloxane.

10-187. Contribution a la Chimie Analytique de l'Indium. (Contribution to the Analytical Chemistry of Indium.) Georges Denigès. *Comptes Rendus,* v. 225, Aug. 25, 1947, p. 369-371.

Four reactions (three of them microcrystalline) present a very simple rapid method for analyzing very small quantities of indium—either free or in compounds. They involve use of the chloride, nitrate, sulphate, and iodate of indium, respectively.

10-188. Identification, par voie Microcristalline, de très Faibles Quantités de Glucinium a l'Etat Métallique. (Identification of Very Small Amounts of Beryllium in the Metallic State by Microcrystalline Methods.) Georges Denigès. *Comptes Rendus,* v. 225, Aug. 25, 1947, p 474-476.

A method of identification using sulphuric acid. Results of the acid attack may be observed at 100 to 150 diameters magnification.

10-189. Applications of the Polarograph to Metallurgical Analysis. Part III—Further Studies on a Polarographic Method for the Determinations of Lead in Copper Base Alloys. G. W. C. Milner. *Metallurgia,* v. 36, Sept. 1947, p. 287-289

A method previously described is interfered with by manganese. An improved method is suitable for alloys containing appreciable amounts of the interfering element.

10-190. Rapid Chemical Analysis With the Recording Polarograph. M. J. Prendergast. *Instrumentation,* v. 3, 4th Quarter, 1947, p. 19-20.

10-191. Spot Tests for Steel; Cr, Ni, Si, Mn. W. E. Thrun and C. H. Bartelt. *Iron Age*, v. 160, Oct. 23, 1947, p. 40-42.

Nondestructive semiquantitative procedures for these elements with emphasis on the principle of dilution to color extinction for determination of alloy elements present in relatively high percentages.

10-192. Quantitative Analysis of Mixed Powders With the Geiger-Counter X-Ray Spectrometer. Zigmond W. Wilchinsky. *Journal of Applied Physics*, v. 18, Oct. 1947, p. 929.

Outlines simple technique.

10-193. Quantitative Analysis With the X-Ray Spectrometer. John C. Redmond. *Analytical Chemistry*, v. 19, Oct. 1947, p. 773-777.

Methods used in the author's laboratory for specimen preparation and preparation of quantitative curves. Semiquantitative and quantitative analysis of mixtures of heavy-metal carbides.

10-194. Fluorometric Determination of Microgram Quantities of Boron. Charles E. White, Alfred Weissler, and David Busker. *Analytical Chemistry*, v. 19, Oct. 1947, p. 802-805.

New, highly sensitive quantitative method is based on the intensity of greenish-white fluorescence obtained upon addition of benzoin, in slightly alkaline 85% ethanol solution. Intensity of fluorescence is shown to be a linear function of boron concentration from 0 to 10 micrograms, in a volume of 50 ml. Accuracy is 1 or 2 parts per hundred. It has been applied successfully to determining a few thousandths of 1% of boron in steel. 17 ref.

10-195. Rapid Determination of the Calcium Content of Lead-Calcium Alloys by Titrating in the Molten State With Metallic Antimony. G. M. Bouton and G. S. Phipps. *Electrochemical Society Preprint 92-13*, 1947, 7 p.

Simple method is based on the quantitative removal of calcium by interaction with antimony and an end-point indicated by the surface appearance of test ingots. The method is applicable to lead alloys containing from 0.005 to at least 2% calcium in the range up to 0.11%. Precision is $\pm 0.002\%$.

10-196. Nondestructive Method for Analysis of Ferrous, Nonferrous, and Precious Metal Alloys. N. A. Tananaev. *Factory Laboratory (U.S.S.R.)*, v. 13, April 1947, p. 389-399; discussion, p. 399-403. (In Russian.)

A quantitative spot test technique for which an accuracy of 0.05 to 0.1% is claimed for quantities under 1%. In discussion, the editor doubts that such accuracy can be obtained.

10-197. "Drop-Time-Measurement" Method of Potentiometric Titration. Part II. A.K. Kal'e. *Factory Laboratory (U.S.S.R.)*, v. 13, April 1947, p. 413-416. (In Russian.)

New technique for potentiometric titration of silver, zinc, cadmium, copper, and lead.

10-198. Use of Methylviolet in Quantitative Determination of Zinc in Iron Ores. M. A. Popov. *Factory Laboratory (U.S.S.R.)*, v. 13, April 1947, p. 416-420. (In Russian.)

Details of colorimetric procedure.

10-199. Carbon Detection by Means of the "Steeloscope". N. S. Sventitskii and K. I. Iaganov. *Factory Laboratory (U.S.S.R.)*, v. 13, April 1947, p. 434-437. (In Russian.)

Determination or identification by a spectroscope with high energy of excitation which permits investigation of the doublet at 4267Å.

10-200. Investigation of the Interactions of the Components of Tin Bronzes in the Condensed Spark Spectrum. E. I. Vorontsov. *Factory Laboratory (U.S.S.R.)*, v. 13, April 1947, p. 438-441. (In Russian.)

Effects of variations in the content of tin, zinc, and lead on the intensity of the principal spectral lines were determined using 25 different standard tin bronzes.

10-201. Spectroscopic Determination of Small Amounts of Boron, Vanadium, Titanium, and Aluminum in Steel. N. V. Byianov, A. V. Lutsenko, and N. N. Sorokina. *Factory Laboratory (U.S.S.R.)*, v. 13, April 1947, p. 447-451. (In Russian.)

Development of a method using a high-voltage a.c. arc.

10-202. Determination of Small Quantities of Antimony in Nonferrous Metals and Alloys Containing Less Than 0.5% Tin. S. A. Filippov and V. F. Vetoshkin. *Factory Laboratory (U.S.S.R.)*, v. 13, April 1947, p. 485. (In Russian.)

Method is based on coprecipitation of antimony with metastannic acid followed by titration.

10-203. Potentiometric Determination of Cadmium in Commercial Products. M. G. Berkovich. *Factory Laboratory (U.S.S.R.)*, v. 13, April 1947, p. 486. (In Russian.)

Modification of a method previously reported by Berg and Wurm (Germany, 1927) and its application to copper-cadmium smelter cakes, and Cottrell-precipitator dusts.

10-204. Application of Organic Ion-Exchange Materials in Analytical Chemistry. Part I. Iu. Iu. Lur'e and N. A. Filippova. *Factory Laboratory (U.S.S.R.)*, v. 13, May 1947, p. 539-547. (In Russian.)

Experiments show 40-fold enrichment of dilute solutions of salts of Ni,

Cu, and Co by use of an ion-exchange resin made by condensing resorcinol, sodium sulphate, and formaldehyde. Experiments on quantitative separation of amphoteric metals from anions and nonamphoteric metals.

10-205. Determination of Small Quantities of Arsenic by Reduction With Metals. M. T. Kozlovskii, R. Z. Vagapova, and N. N. Zavalishcheva. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 549-554. (In Russian.)

Effects of different factors on the completeness of reaction with sodium amalgam and with aluminum. Results indicate a maximum of 95% reaction, but more complete and predictable results than with zinc (Marsh test), using sodium amalgam. 22 ref.

10-206. Electrometric Method for Determination of Nickel and Cobalt in Ores. S. K. Chirkov. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 558-564. (In Russian.)

Method is based upon measurement of variations in the potential of bimetallic electrode pairs in solution during titration. Curves show the effects of different electrode pairs on determinations of each of the above elements in either the presence or absence of the other, and of the two combined, in either presence or absence of manganese.

10-207. Photocolorimetric Determination of Phosphorus and Silicon in Ferrous Metals. E. I. Fogel'son and F. S. Kazachkova. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 565-568. (In Russian.)

Results obtained with a photocolorimeter made in Russia and with the Fisher electrophotometer (U. S.) on a series of cast irons and steels. Preparation of the solutions and evaluation of the instruments.

10-208. Application of a Polarographic Method for Determination of Copper and Iron in Crude and in Cathode Nickels. I. A. Korshunov, L. N. Sazanova, and M. K. Shchennikova. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 569-571. (In Russian.)

Method using a dropping-mercury electrode and a visual polarograph.

10-209. Determination of Zinc and Cadmium in Ores and Rocks Under Field Conditions. M. A. Popov. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 618-619. (In Russian.)

Sensitive colorimetric spot test for determining both elements in the same solution, without separation.

10-210. Determination of Free Metal in Slags From Refining of Scrap Aluminum. A. D. Maiants. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 619-620. (In Russian.)

Two methods, one based on chemical reduction, the other on melting with addition of fresh flux and weighing of the obtained "secondary slag". The second method is simpler and the error is only 1.5 to 2.0%, since only an insignificant amount of free metal remains in the "secondary slag".

10-211. Determination of Lead in Steels by a Polarographic Method. Z. S. Mukhina. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 620-621. (In Russian.)

A comparison of two polarographic methods (using 6*N* HCl and 12% H_3PO_4), with the molybdate method. Equally satisfactory results are obtained with all three methods.

10-212. Photo-Electric Method for Determination of Aluminum in Steel. T. P. Temirenko. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 621-623. (In Russian.)

Method utilizing a photo-electric colorimeter. The analysis is preceded by separation of iron using the dropping-mercury cathode. 11 ref.

10-213. Determination of Silicon With the "Steeloscope". N. S. Sventitskii and M. F. Fedorov. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 626-628. (In Russian.)

The spectroscopic determination, including the relative intensities of the various lines and their applicabilities for analysis of different steels, cast irons, and nonferrous and light alloys. Details of a.c. generator and arc circuits.

10-214. Application of the A.C. Arc With Magnetic Extinction as a Light Source for Spectral Analysis With the "Steelometer". P. F. Lokhov. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 628-630. (In Russian.)

The circuit for the above permits rapid transition from one means of operation to the other. Comparative results of chemical and spectroscopic analysis for small concentrations of Mo, Mg, Cr, W, and Ni. Analysis using the usual apparatus for these elements is said to be almost impossible.

10-215. Influence of Hydrogen-Ion Concentration on the Colored Complex Compounds Used in Colorimetry. A. K. Babko. *Factory Laboratory (U.S.S.R.),* v 13, June 1947, p. 645-655. (In Russian.)

A series of specific cases. 11 ref.

10-216. Colorimetric Determination of Tungsten in Ores in the Presence of Arsenic, Antimony, Molybdenum, Titanium, and Phosphorus. F. A. Fer'ianchich. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 668-676. (In Russian.)

Proposes a new reaction based on the reduction of the complex of tungstic and thiocyanic acids by trivalent titanium. Test results indicate appli-

cability to 0.003 to 1.5% W, in ores containing up to 10% As; up to 3 to 6% Sb; up to 0.5 to 3% Mo; up to 0.3% Cr; and up to 0.1% V, Se, or Te. The presence of traces of F, Ti, P, Cb, Ta, Cu, and precious metals (except rhenium) does not interfere. 11 ref.

10-217. Concerning the Possibility of Colorimetric Determination of Molybdenum and Tungsten in the Presence of Nitrates and Nitrites. O. A. Songina and M. T. Kozlovskii. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 677-678. (In Russian.)

Nitrate ion does not interfere with colorimetric determination of Mo and W by lead chloride and thiocyanates of the alkali metals. The presence of nitrites in amounts above 4 mg. per ml. makes the determination impossible.

10-218. Precipitation of Tungsten Ion by Means of Sulfamido-2, 4-Diaminoazobenzene (Red Streptocide). V. V. Fomin, V. V. Shaliagin, and V. G. Starostina. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 679-680. (In Russian.)

Use of the above compound for precipitation of tungsten or molybdenum from solutions of their salts. Tungsten only may be precipitated by using reagent dissolved in concentrated HNO_3.

10-219. Qualitative Determination of Vanadium. M. A. Popov. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 680-682. (In Russian.)

Existing methods with emphasis on the use of alpha-naphthylamine under certain conditions which permit detection of 1 part in 25,000.

10-220. Consecutive Determination of Manganese and Nickel or Chromium and Nickel in Steels Using One Sample. A. G. Bogdanchenko. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 748-751. (In Russian.)

One of the principal modifications of a well-known method is the use of a specific amount of $AgNO_3$ solution as catalyst for oxidation of Mn and Cr, which solution later serves as indicator during titration of nickel. Procedures for each combination in the presence and absence of copper.

10-221. Determination of Manganese by a Periodate Method. K. N. Ershova and G. N. Volkova. *Factory Laboratory (U.S.R.R.),* v. 13, June 1947, p. 751. (In Russian.)

Method for steels containing 0.17 to 0.65% Mn.

10-222. Determination of Boron in Ferroboron. L. E. Sabinina and T. V. Stiunkel'. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 752-753. (In Russian.)

A volumetric method using $Ba(OH)_2$.

10-223. Identification of War Steel Bar Stock. Part II. A. W. Ehlers. *Tool & Die Journal,* v. 13, Nov. 1947, p. 74-77.

Spot tests for nickel, chromium, tungsten, molybdenum, and stainless steel. Procedures using the magnetic comparator and the cathode-ray oscilloscope.

10-224. The Determination of the Gases in Meteoritic and Terrestrial Irons and Steels. Leonard K. Nash and Gregory P. Baxter. *Journal of the American Chemical Society,* v. 69, Oct. 1947, p. 2534-2544.

No method is completely satisfactory, but solution with aqueous mercuric chloride is the best, and method may yield good results for steels which do not contain too large a quantity of combined carbon. The essential similarity of the gases in terrestrial and meteoritic steels. 43 ref.

10-225. Absorption Spectrochemical Analysis in the Ultraviolet Region of the Spectrum. Iu. Ia. Mikhailenko. *Progress in Chemistry (U.S.S.R.),* v. 16, July-Aug. 1947, p. 443-460. (In Russian.)

A review. 226 ref.

10-226. An Automatic Arc-Current Regulator. E. V. Potter and Arden Scott. *Review of Scientific Instruments,* v. 18, Oct. 1947, p. 722-726.

Standard curves obtained using the regulator are more regular and reliable, and individual points can be reproduced more closely than those from an uncontrolled arc. Analyses can also be reproduced more closely, and results are in better agreement with chemical analyses than those obtained with the uncontrolled arc.

10-227. Automatic Recording of Titrations. J. M. Gonzalez Barredo and John Keenan Taylor. *Electrochemical Society Preprint 92-26,* 1947, 8 p.

One source of error in volumetric analysis is the exact measurement of the volume corresponding to the equivalence point. New method removes this difficulty and substitutes an automatic measurement of time for the direct measurement of volume. Applications to electrometric titrations and to those in which the end-point is indicated by a change in adsorption of radiant energy.

10-228. Remarques sur le Dosage de l'Uranium par la Methode d'Auger. (Remarks Concerning Determination of Uranium by Auger's Method.) Georges Weiss and Pierre Blum. *Bulletin de la Société Chimique de France,* v. 14, July-Aug. 1947, p. 735-737.

Results of a potentiometric study of the process of oxidation of tetravalent uranium to the hexavalent state, using ferric ion. Conditions under which this method may be used for uranium

determination. Confirmation of Auger's conclusions is indicated. The role of ammonium sulphocyanide as an indicator.

10-229. Uziti Spektralniho Rozboru v Hutnictvi. (Application of Spectrographic Analysis in the Metals Industry.) A. K. Pokorny. *Hutnické Listy,* v. 2, Sept. 1947, p. 51-57.

Some of the methods in use and practical examples such as in ore testing, raw-material control, tapping control.

10-230. Le Dosage Spectrographique de l'Alumine dans les Résidus d'Oxydes Métalliques. Application au Dosage de l'Oxygène dans les Aciers Spéciaus. (Spectrographic Determination of Aluminum in Metallic Oxide Residues. Application of This Method for Determination of Oxygen in Special Steels.) René Castro and J. M. Pheline. *Comptes Rendus,* v. 225, Oct. 13, 1947, p. 633-635.

How oxygen in steel may be isolated by addition of aluminum to liquid steel. The aluminum oxide found is then separated by an appropriate chemical method, resulting in a residue of alumina. The spectrographic method is recommended for the determination of the small amounts of aluminum present, from which the oxygen content may be readily calculated.

10-231. Determination of Silver and Copper in One Sample of Plating Solution. Louis Silverman. *Metal Finishing,* v. 45, Nov. 1947, p. 80-82.

Modified procedures which are claimed to improve the speed and accuracy of Mott's iodide-titration method for copper in cyanide and acid plating solutions. Titration procedure for silver and copper in one sample.

10-232. An Improved Spectrographic Source. C. Braudo and H. R. Clayton. *Journal of the Society of Chemical Industry,* v. 66, Aug. 1947, p. 259-267.

A spectrographic source of stable characteristics. The circuit was tested by analyzing numerous samples of pure aluminum and an aluminum alloy. 35 ref.

10-233. Hydrogen, Nitrogen and Oxygen in Ferrous Metals. Their Properties and Their Determination. Part I. E. C. Pigott. *Metallurgia,* v. 36, Oct. 1947, p. 335-338; v. 37, Nov. 1947, p. 23-27.

A critical review.

10-234. Investigations on Colorimetric Methods of Metallurgical Analysis. Part III. Permanent Standards for the Colorimetric Determination of Molybdenum in Alloy Steels. G. V. L. N. Murty. *Metallurgia,* v. 36, Oct. 1947, p. 345-346.

The stability of the color involved in the visual colorimetric estimation of molybdenum in alloy steels cannot be increased beyond 8 hr. by modifications in procedure or addition of perchloric acid. Preparing duplicates of these colors by mixing solutions of inorganic substances. Satisfactory duplicates may be prepared from mixtures of potassium dichromate and cobalt nitrate solutions.

10-235. The Determination of Zinc in Metallic Cobalt by Dithizone. R. S. Young. *Metallurgia,* v. 36, Oct. 1947, p. 347-348.

A method claimed to have some advantages over conventional methods when small quantities are involved.

10-236. Chips for Chemical Analysis. C. O. Lundberg. *Metal Progress,* v. 52, Nov. 1947, p. 811.

Fine, short chips can be easily obtained by using an ordinary drill ground nearly flat.

10-237. A Systematic Scheme for Identifying Corrosion Resistant Metals. Chester J. Zeeh. *Metal Progress,* v. 52, Nov. 1947, p. 824, 824B, 825.

Qualitative analysis chart including use of electrographic tests. Construction of electrograph. Analysis scheme also includes other simple and rapid techniques, such as spot and magnetic testing.

10-238. The Art of Carbometry. F. S. Ellis and Horace Mac Lees. *Blast Furnace and Steel Plant,* v. 35, Nov. 1947, p. 1357-1358.

"Carbometry" is the determination of carbon in steel. Carbometers are electrical instruments which measure some property related to carbon content. Basic principles of good carbometry.

10-239. Tin-Base Bearing Metals; Selected Methods of Chemical Analysis. J. W. Price. *Metal Industry,* v. 71, Nov. 14, 1947, p. 399-400.

Scheme of analysis is based on selected methods in use at the Tin Research Institute for white-metal bearing alloys containing more than 80% tin.

10-240. Qualitative Semimicro-Analysis With Reference to Noyes and Bray's System: Partial Analysis of the Combined Nickel, Zirconium, and Rare-Earth Groups. Christina C. Miller. *Journal of the Chemical Society,* Oct. 1947, p. 1347-1350.

A scheme of analysis for the detection and approximate determination of 0.25 to 50 mg. of Mn, Co, or N; 0.25 to 10 mg. of Ti, Zr, In, Sc; and a small amount of Zn (minimum 0.25 mg.) in solutions containing a maximum of 50 mg. referred to the metals. These include all of the more important elements present in the combined nickel, zirconium, and rare-earth groups of Noyes and Bray's scheme.

10-241. Spot Tests for the Detection of Alloying Elements in Tin-Base Alloys. B. S. Evans and D. G. Higgs. *Analyst*, v. 72, Oct. 1947, p. 439-443.

Tests for lead, copper, arsenic, antimony, zinc, and aluminum.

10-242. A System of Qualitative Analysis for the Common Metals in Presence of Phosphates, Using Ammonium Benzoate. G. J. Austin. *Analyst*, v. 72, Oct. 1947, p. 443-446.

Modification of the benzoate iron-group separation in which the solution remains acid until all the metals except magnesium and alkali metals have been separated. This system of analysis can be applied regardless of the presence of phosphate.

10-243. Spectrophotometric Determination of Iron in Ores With 2,2′-Bipyridyl. J. P. Mehlig and M. J. Shepherd, Jr. *Chemist-Analyst*, v. 36, Nov. 1947, p. 52-55.

Method depends upon reducing the iron with hydroxylamine hydrochloride and measuring the light transmittancy at 522 mμ of the colored solution produced by 2,2′-bipyridyl within the pH range of 3 to 9. Results agree closely with those obtained by the dichromate titrimetric method. 13 ref.

10-244. Analytical Application of Sodium Bis (2-Hydroxyethyl) Dithiocarbamate. E. J. Serfass and W. S. Levine. *Chemist-Analyst*, v. 36, Nov. 1947, p. 55-57.

New modification of the dithizone method for determining zinc in nickel plating baths.

10-245. Spot Test for the Detection of Cadmium in Plating on Metals. Karl A. Jorczak. *Chemist-Analyst*, v. 36, Nov. 1947, p. 64.

Consists of cleaning with 20% HCl and adding a crystal of Na_2S. In presence of Cd, a yellow residue of CdS is formed.

10-246. Determination of Phosphorus, Germanium, Silicon, and Arsenic by the Heteropoly Blue Method. D. F. Boltz and M. G. Mellon. *Analytical Chemistry*, v. 19, Nov. 1947, p. 873-877.

A study of the heteropoly blue method for phosphorus, germanium, silicon, and arsenic using a Beckman spectrophotometer. 31 ref.

10-247. The Quantometer—a Tool for the Metallurgist. Walter Bonsack. *Metal Progress*, v. 52, Dec. 1947, p. 975-978.

How a direct-reading spectrometer speeds the quantitative analysis of light-metal alloys for 20 individual elements Light from a single selected spectral line from each element is absorbed by an individual photoelectric cell, and the current so generated is multiplied by electron tubes so that it drives a counter and indicates the result on a printed tape.

10-248. Russian Methods for Spot Testing Steel. *Iron Age*, v. 160, Dec. 18, 1947, p 76.

Spot testing methods used by Russian chemist for Cr, Mo, Al, Ni, W, and Va.

10-249. Quantometer Speeds Aluminum Alloy Analyses. T. S. Blair. *Iron Age*, v. 160, Dec. 18, 1947, p. 65-67, 135.

Application of the Quantometer, a special direct-reading spectrometer, to the manufacture of aluminum casting alloys. It is capable of 5-min. analyses on a production basis. (Similar to "The Quantometer—a Tool for the Metallurgist", Walter Bonsack, *Metal Progress*, v. 52, Dec. 1947, p. 975-978. See item 10-247 above.)

10-250. More Time for Bath Alterations Provided by Use of Spectrograph in Steel Plants. B. W. Bowen. *Steel*, v. 121, Dec. 29, 1947, p. 69-70, 72.

Instrument permits simultaneous determination of all elements on one sample, thus allowing more time for the melter to alter the furnace or ladle additions, or the sizes of molds into which the heat is to be poured. The technique is satisfactory for basic iron, openhearth slags, or fully killed, deep drawing steels. (Presented at the annual meeting of Southern Ohio Section, National Open Hearth Committee, A.I.M.E., Columbus, Ohio, Oct. 31, 1947.)

10-251. Automatic Potentiometric Titrations. H. A. Robinson. *Electrochemical Society Preprint 92-38*, 1947, 19 p.

Automatic apparatus developments, including an instrument, capable of automatically performing and plotting potentiometric titrations, and adaptable to a variety of electrode systems; its calibration, method of use, and performance characteristics. 14 ref.

10-252. Determinazione di Mg nelle Leghe Leggere Contenenti Mn. (Determination of Magnesium in Light Alloys Containing Manganese.) F. Bressan and G. Besazza. *Alluminio*, v. 16, July-Aug. 1947, p. 293-297.

According to the method proposed, the major part of the aluminum is removed with NaOH and the Mg is precipitated as ammonium-magnesium phosphate, while the other substances are maintained in solution by citric acid and potassium ferricyanide in ammonia solution. 33 ref.

10-253. Quantitative Microchemical Analysis of Minerals, Ores, and Rocks. Part IX. Determination of Total Alkali-Metal Content. I. P. Alimarin. *Factory Laboratory (U.S.S.R.)*, v. 13, Aug. 1947, p. 917-920. (In Russian.)

Proposes modification of Tananaeff's method in which the residue is cal-

cined after treating with HF and excess oxalic acid. 10 ref.

10-254. Drop Methods of Analysis for Classification of Stellites, Beryllium Steels, Chromium Steels, and Bronzes. E. I. Nikitina. *Factory Laboratory (U.S.S.R.),* v. 13, Aug. 1947, p. 923-925. (In Russian.)

Methods developed by the author. 10 ref.

10-255. Photo-Electric Method of Simultaneous Determination of Chromium and Manganese in Steel. V. F. Mal'tsev and A. L. Davydov. *Factory Laboratory (U.S.S.R.),* v. 13, Aug. 1947, p. 926-929. (In Russian.)

A newly developed photo-electric spectrophotometer using an electronic amplifier. Method of application. 10 ref.

10-256. Colorimetric Determination of Magnesium by Means of Titanium Yellow. S. S. Shraibman. *Factory Laboratory (U.S.S.R.),* v. 13, Aug. 1947, p. 930-934. (In Russian.)

The method proposed by Kilthoff in 1927 was thoroughly investigated. The effects of temperature, presence of sodium chloride, calcium, iron, aluminum, and other factors. Results indicate that the slightly modified method presented permits the determination to be completed in 3 to 5 min.

10-257. Rapid Potentiometric Method for Copper Determination in Ferrous and Nonferrous Alloys. Iu. I. Usatenko and O. V. Datsenko. *Factory Laboratory (U.S.S.R.),* v. 13, Aug. 1947, p. 1009-1012. (In Russian.)

A modification of the method of W. Hiltner and W. Grundmann. The time for a determination varies between 10 and 20 min., depending on the speed of solution of the test specimen. 10 ref.

10-258. Volumetric Determination of Copper After Its Separation by Means of Thiosulphate. Kh. N. Pochinok. *Factory Laboratory (U.S.S.R.),* v. 13, Aug. 1947, p. 1012-1014. (In Russian.)

Development of a satisfactory method in which copper is precipitated as Cu_2S and reacted with ferric ion to produce ferrous ion and free sulphur. The ferrous ion is titrated with permanganate. It is necessary, however, to use exactly the right amount of thiosulphate, which is known by means of a color reaction. Effects of variations. The method is suitable for mixtures of Cu, Fe, Zn, other metals of the 3rd group, and also Cd.

10-259. Determination of Manganese and Cobalt in the Same Test Specimen by Means of Potentiometric Titration. V. I. Gladushko. *Factory Laboratory (U.S.S.R.),* v. 13, Aug. 1947, p. 1014-1015. (In Russian.)

A method used for slags of cobalt ores in one of the copper smelters of the U.S.S.R. The time required for a determination varies between 30 and 60 min., depending on particle size and acidity of the ore.

10-260. Quantitative Spectrographical Analysis of White-Metal Using Spark Excitation. J. Gillis, J. Eeckhout, and M. Van Doorselaer. *Analytica Chimica Acta,* v. 1, Sept. 1947, p. 209-217. (In English.)

Method used for an antifriction tin-base alloy containing approximately 11% Sb, 6% Cu, and smaller amounts of Pb and As. Working curves for the impurities and for the chief constituents of the alloy. Method is simple and rapid and, considering its rather high accuracy, its application can be of great use in foundries where analyses must be carried out in series every day.

10-261. Sur Quelques Réactifs des Ions du Groupe de l'Aluminium. (Some Reagents for Ions of the Aluminum Group.) *Analytica Chimica Acta,* v. 1, Sept. 1947, p. 218-248.

New reagents and new applications of existing reagents proposed since the first and the second reports of the International Committee on New Analytical Reactions and reagents for Al, Be, Ti, Zr, Ga, In, Sc, Y, rare earths, and Tl. Proposes use of chrome blue for the detection of Al and Ga and morine in an alkaline medium for detection of Be.

10-262. La Methylfluorone, Réactif Spécifique de l'Antimoine. (Methylfluorene, a Specific Reagent for Antimony.) J. Gillis, J. Hoste, and A. Claeys. *Analytica Chimica Acta,* v. 1, Sept. 1947, p. 291-301.

Results of a study of spot reactions of methylfluorene for qualitative detection of antimony. Color reactions of 44 different ions with this compound.

10-263. Un Réactif Spécifique du Germanium: La Phenylfluorone. (A Specific Reagent for Germanium: Phenylfluorene.) J. Gillis, J. Hoste, and A. Claeys. *Analytica Chimica Acta,* v. 1, Sept. 1947, p. 302-308.

Results of a study of use of phenylfluorene for qualitative spot-test detection purposes. Color reactions with 52 different ions.

10-264. Recherche du Cerium Au Moyen d'Indicaters d'Oxydo-Reduction. (Cerium Research Using Oxidation-Reduction Indicators.) G. Charlot. *Analytica Chimica Acta,* v. 1, Sept. 1947, p. 309-313.

A study of oxidation-reduction indicators suggested for the detection of cerium. Recommends use of N-phenylanthranilic acid. 11 ref.

10-265. Volumetric Method for Determination of Rhodium. V. S. Syrokomskii and N. N. Proshenkova. *Journal of Analytical Chemisty (U.S.S.R.),* v. 2, Sept-Oct. 1947, p. 247-252. (In Russian.)

A new method for direct potentiometric titration of pentavalent rhodium by ferrous oxide in the presence of phenylanthranilic acid, applicable in the presence of platinum, particularly for alloys of Pt containing 7 to 10% Rh.

10-266. An Experiment on the Qualitative Gaseous-Phase Analysis of Copper and Its Oxides and Sulphides. N. A. Tananaev. *Journal of Analytical Chemistry (U.S.S.R.),* v. 2, Sept-Oct. 1947, p. 253-258. (In Russian.)

Development of a method which may be used as a basis for the development of a quantitative method.

10-267. Dosage Semi-Quantitatif de l'Or. (Semi-Quantitative Determination of Gold.) P. W. Wenger, D. Monnier, and Y. Rusconi. *Helvetica Chimica Acta,* v. 30, Oct. 15, 1947, p. 1636-1638.

Use of mercurous chloride in above analysis in order to control the composition of the cyanide solutions used in recovery of gold from ores. Hg_2Cl_2 reduces the complex to metallic gold in acid solutions. The gold particles adhere to the surface of the suspended particles of Hg_2Cl_2, coloring the precipitate violet.

10-268. Spectrochemical Analysis of Metals and Alloys by Direct Intensity Measurement Methods. J. L. Saunderson. *Electronic Methods of Inspection of Metals (American Society for Metals),* 1947, p. 16-53.

Basis of spectrochemical analysis; and the principles, construction, and operation of different types of spectrometers used at Dow Chemical Co. 13 ref.

10-269. Report of Committee E-2 on Spectrographic Analysis. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 476-485.

Recommendations for changes in standard methods as well as tabulated results of cooperative tests on methods for: nitrogen in steel; sulphur by direct combustion in steel; polarographic determination of Pb and Cd in Zn; analysis of special brasses and bronzes for As, Sb, and Sn; analysis of white-metal bearing alloys; photometric determination of Bi in pig lead; photometric analysis of Mg and Mg-base alloys, of Cu and Cu-base alloys, of Fe in 70-30 Cu-Ni alloy, of Fe in slab zinc (spelter), of Fe in Pb and Sn-base alloys, and of Zn in Pb and Sn-base alloys. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

10-270. Colorimetric Determination of Nickel and Chromium in a Combined Form of Analysis. Winfield B. Sobers. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 324-327.

10-271. Combustion Method for Sulphur Determination in White Cast Iron. James Hedberg and H. A. Schwartz. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 396-397.

10-272. Separation of Cadmium From Zinc by Electrochemical Means. W. H. Hammond. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 393-419.

204 references.

SECTION XI

INSTRUMENTS AND LABORATORY APPARATUS

11-1. Report of the Electron Microscope Society of America's Committee on Resolution. *Journal of Applied Physics,* v. 17, Dec. 1946, p. 989-996.

Resolving power and resolution, and the various known or suggested methods for quantitative or qualitative evaluation of this factor.

11-2. A Machine for the Application of Sand in Making Fourier Projections of Crystal Structures. Dan McLachlan, Jr. and E. F. Champaygne. *Journal of Applied Physics,* v. 17, Dec. 1946, p. 1006-1014.

Method used in building models of two-dimensional Fourier projections in crystal structure analysis. Results illustrated by projections of known structures. Several advantages of this method over the Bragg photographic method are pointed out.

11-3. Trentini Surface Tester. *Industrial Diamond Review,* v. 6, Dec. 1946, p. 375.

Swiss instrument in which surface finish or roughness is measured by producing shocks in an electrical system. These shocks are produced by drawing a needle with a blunt point across the surface at constant velocity and under constant load, the magnitude of the impulses being proportional to the roughness of the measured surface.

11-4. La Realisation et les Applications des Diagrammes de Reflexion en Radiocristallographie. (Realization and Application of Reflection Diagrams in X-Ray Crystallography.) J. Benard. *Métaux et Corrosion,* v. 21, March 1946, p. 33-39.

A number of examples of possible applications of the method of reflection diagrams in X-ray crystallography. Most of them have been successfully applied on an industrial scale.

11-5. Control and Measurement of Surface Finishes. James A. Broadston. *Steel,* v. 120, Jan. 13, 1947, p. 82, 116, 118, 121.

Some ideas that will assist in making proper selection of surface finish measurement instrumentation. Importance of surface quality control.

11-6. New Method of Electrolytic Polishing of Electron Microscope Samples. E. Der Mateosian. *Iron Age,* v. 159, Jan. 16, 1947, p. 51-53.

New method of electropolishing metal surfaces so that replicas for use with the electron microscope can be duplicated. A feature of this process is the use of chilling to expand the pH range in which polishing can be observed.

11-7. Metallizing Applications. *Electronics,* v. 20, Jan. 1947, p. 192, 194.

Outlines four applications of the deposition of thin metallic layers from the vapor state. Three are for electronic use, the fourth is used in Russia as an extremely fast method for preparing a series of alloys for study of their properties.

11-8. Profile and Surface Analysis. Part II. *Aircraft Production,* v. 8, Dec. 1946, p. 557-560.

Combined mechanical and optical methods for checking by projection as applied to surfaces of certain components, including valve sleeves.

11-9. Types of Strain Measuring Devices and Their Range of Utility. Karl F. Smith. *Product Engineering,* v. 18, Jan. 1947, p. 107-110.

Data for selecting the proper extensometer, strain gage, or strainometer to suit a given application, particularly in the field of metallic materials. Survey of types of instruments and their limitations is based upon author's experience with the different strain gages used at Battelle Memorial Institute.

11-10. Electrical Indicating Instruments. L. F. Parachini. *Product Engineering,* v. 18, Jan. 1947, p. 123-131.

Fundamental mechanisms, operating characteristics, and range of functional uses of generally used electrical indicating instruments. Moving iron, electrodynamometer, and permanent magnet moving coil types, plus guidance on using common accessories such as shunts, instrument transformers, dry rectifiers and thermocouples.

11-11. A Very High Impedance R.M.S. Voltmeter for Iron Testing. D. C. Gall. *Journal of Scientific Instruments,* v. 23, Dec. 1946, p. 287.

Design of a valve amplifier for use in conjunction with an a.c. indicating voltmeter. The device is applicable to inspection of iron samples.

11-12. Investigation of Methods of Determining the Weight or Average Thickness of Tin on Tin-Coated Copper and Brass. K. R. Hanna. *ASTM Bulletin,* Dec. 1946, p. 35-37.

Method recommended involves the selective stripping of tin in a boiling solution of sodium hydroxide containing suspended bismuth hydroxide. Two other methods involving the use of sodium hydroxide-potassium iodate solution and a trichloroacetic acid solution, respectively, are suggested as alternatives.

11-13. Low-Order Multiple-Beam Interferometry. S. Tolansky. *Proceedings of the Physical Society,* v. 58, Nov. 1, 1946, p 654-662.

Factors affecting the intensity and sharpness of multiple beam Fizeau fringes and fringes of equal chromatic order used for the study of surface topography. Effects of the absorption in the silver film, phase condition, linear displacement of the beams, finite size of source, departure from parallelism, and source line width. 11 ref.

11-14. Geometrical Problems of the Reflection Goniometer. M. Fehr. *Industrial Diamond Review,* v. 7, Jan. 1947, p. 6-8.

Clarifies a number of problems involved in proper use of above instrument for measurements required in production of diamond and other tool edges.

11-15. Electronics in Industrial Process Measurements. Douglas M. Considine and Donald P. Eckman. *Radio News,* v. 37, Feb. 1947, Engineering Dept. p. 16-17, 26-28.

Electronic potentiometers; Geiger-counter X-ray spectrometer; recording polarograph; ultraviolet spectrophotometers; infrared spectrophotometers; instruments for measuring high vacuums; refinements in pH measurement.

11-16. Metallurgical Application of the X-Ray Diffraction Spectrometer. Part I. John L. Abbott. *Iron Age,* v. 159, Feb. 13, 1947, p. 50-53.

Various aspects relating to the operation of the equipment and diffraction curves which indicate the effects of apparatus variables on diffraction patterns.

11-17. X-Ray Flicker Photometer. C. D. Moriarty. *General Electric Review,* v. 50, Feb. 1947, p. 39-42.

New method of nondestructive testing, utilizing combination of X-rays and phototubes for measuring X-ray absorption of materials.

11-18. X-Ray Photometer. T. C. Michel and T. A. Rich. *General Electric Review,* v. 50, Feb. 1947, p. 45-48.

An instrument designed for general commercial application.

11-19. Nouvelle Methode pour Determiner au Moyen des Rayons X l'Orientation Cristallographique d'Une Section Plane de Monocristal Epais. (A New Method for the X-Ray Determination of the Crystallographic Orientation of a Plain Section of a Thick Monocrystal.) Rene Graf. *Comptes Rendus,* v. 223, Dec. 23, 1946, p. 1152-1154.

A new method permitting the use of much smaller angles of diffraction permits reduction of time of exposure, and increase in the sharpness of the pattern.

11-20. Metallurgical Applications of the X-Ray Diffraction Spectrometer. Part II. John L. Abbott. *Iron Age,* v. 159, Feb. 20, 1947, p. 57-61.

Effects of heat treatment on the X-ray diffraction patterns of S.A.E. 3312 steel and 24S aluminum, and the effects of cold working on the X-ray diffraction pattern of S.A.E. X4340 steel. Correlates the metallurgical structure of each specimen with the corresponding diffraction curve.

11-21. Notes on Polishing Technique. *Metal Progress,* v. 51, Feb. 1947, p. 260-264.

Polishing of 0.60 Carbon Steels, by C. Patrick Kenyon; Attack Method for Preparing Tungsten, by Harry W. Woods; Improved Polishing Circuit, by Julius Horowitz and Joseph Maltz.

11-22. Electrical Detection of Traces of Poisonous Gases in the Atmosphere. J. Boeke. *Philips Technical Review,* v. 8, Nov. 1946, p. 341-345.

A catalyst of finely divided platinum which catalyzes an oxidation reaction is found to be hindered in its function by many gases which are also poisonous to the human body. Based on this fact, an instrument has been designed which can detect the occurrence of poisonous gases, for instance carbon monoxide in mines, garages or boiler-houses, and hydrocyanic acid gas in galvanizing shops.

11-23. The Metallurgical Microscope. D. E. Roda. *Iron Age,* v. 159, Feb. 27, 1947, p. 53-55.

Excellent results can be expected with proper use of microscope even in the upper and lower limits of magnification. Photomicrographs show the same area of a steel specimen, ranging from 115× to 3900×.

11-24. A Method of Using Marked Phase Boundaries. Robert Jagitsch. *Nature*, v. 159, Feb. 1, 1947, p. 166.

Method uses a minute amount of a substance which does not react with either of the phases or interfere with their reaction to determine the direction of migration between solid phases. Method has been found suitable for several systems listed.

11-25. Evaluates Finishes. *Steel*, v. 120, March 17, 1947, p. 112.

Evaluation of surface finish or roughness is obtained by a new National Bureau of Standards method in which a carefully prepared plastic replica of the surface is analyzed by photoelectric means. Replica is produced by applying a suitable solvent to the test surface, and pressing on a strip of clear plastic film. When dry, the film is readily stripped from the surface.

11-26. Interferometric Determination of Apparent Thickness of Coatings. W. K. Donaldson and A. Khamsavi. *Nature*, v. 159, Feb. 15, 1947, p. 228-229.

Method for measuring thickness of evaporated metal films.

11-27. Surface Finish Requirements. J. T. Ford. *Die Castings*, v. 5, March 1947, p 55-56

Microscope, reflection meter, and profilometer for examining surfaces. The profilometer is the best of the three methods for defining roughness of raw and plated die-casting surfaces.

11-28. Het Electronenmicroscoop. (The Electron Microscope.) H. J. De Heer. *Metalen*, v. 1, Feb. 1947, p. 101-104.

The principles of the electron microscope and certain design problems. Describes the instrument at the Netherlands Institute for Electron Microscopy at Delft, Holland.

11-29. Some Applications of Optical Crystallography. N. H. Hartshorne. *Endeavour*, v. 6, Jan. 1947, p. 15-20.

Principles and applications of the polarizing microscope to identification and analysis of solid substances.

11-30. Practical Aspects of Surface Finish Measurement Instrumentation. James A. Broadston. *Iron Age*, v. 159, March 20, 1947, p. 51-55.

Practical application of surface finish control. Development of finish control and instruments available for measuring surface finish in the plant. Effectiveness, costs and methods of using various types of finish control devices.

11-31. Mounting for Edge Examination. André Hone. *Metal Progress*, v. 51, March 1947, p. 435-437.

Method consists of coating the sample, prior to mounting in the conventional way, with a substance having sufficient penetrating power, adherence, hardness, and elasticity. Gives satisfactory results for aluminum and its alloys.

11-32. Spotting Iron Contamination on Stainless Surfaces. M. A. Scheil. *Metal Progress*, v. 51, March 1947, p. 442-443.

New method, first used to detect pinholes in nickel plating, using "ferroxyl" paper was adapted to the above purpose. Formation of Turnbull's blue spots indicates contamination.

11-33. Metallographic Techniques for Magnesium Alloys. P. F. George. *Aluminum and Magnesium*, v. 3, Feb. 1947, p. 11-13, 24-25.

Etchants, with their compositions, etching techniques, and uses for special metallographic techniques. The picric acid etchants change their etching characteristics in a few hours, and therefore cannot be made up in advance. However, the 5% picral solution can be made in advance and used as a stock solution in all the etchants containing picral.

11-34. Magnetic Detection of Ferrite in Incomplete Hardening. L. M. Baldina, M. V. Dechtjar, and A. M. Gorbunov. *Engineers' Digest (American Edition)*, v. 4, March 1947, p. 141.

Temperature differences in the hardening process for shafts of "40X" steel, which has a demagnetization factor of 0.18 ($1/d = 10$), have a marked effect on coercive force. Measurements of this force indicate the homogeneity of the material, which is an important factor in determining the quality of the product. (Condensed from *Zavodskaja Laboratorija*, no. 7-8, 1946, p. 692-799.)

11-35. X-Ray Scattering at Small Angles by Finely Divided Solids. Parts I and II. C. G. Shull and L. C. Roess. *Journal of Applied Physics*, v. 18, March 1947, p. 295-313.

Part I includes the general theory, calculation of scattered intensity curves and several procedures for obtaining a size distribution. Details of experimental techniques including general procedures for applying corrections for slit geometry. Scattering data, mass distribution curves, and average particle sizes for amorphous silica gels and for crystalline oxides of alumina, nickel and iron. Part II presents an exact theory for X-ray scattering at small angles by a continuous distribution of randomly spaced spheroidal particles having an arbitrary but fixed shape. 26 ref.

11-36. Théorie Electro-Chimique de l'Action des Réactifs Employés pour la Métallographie Microscopique des Fontes Grises Fondée sur l'Expérience. Application aux Fontes de Lingotières d'Aciéries. (Electrochemical Theory of the Action of Reagents Used for Microscopic Metallography of Gray Iron, Based on Experimentation. Application to Cast Irons for Steel Ingot Molds.) Louis-Fernand Girardet. *Fonderie,* no. 12, 1946, p. 455-461; discussion, p. 461.

Seven types of experiments with various saline electrolytes and gray irons. Modifications of the ratio of anodic surface to cathodic surface. Application of this study to cast-iron ingot molds.

11-37. A New Time-of-Gassing Test of Thickness of Cadmium Coatings, Particularly for Small Parts. S. G. Clarke and J. F. Andrew. *Journal of Electrodepositors' Technical Society* (Reprint), v. 22, 1947, p. 1-7.

A nickel salt in concentrated hydrochloric acid has a strong equalizing effect on the rate of solution of cadmium coatings. Its use in a simple improved time-of-gassing method. Recommended for testing small articles, which are difficult or inconvenient to deal with by existing tests for average or local thickness of coatings.

11-38. Note on a Convenient Method of Electropolishing Aluminum Alloys. U. R. Evans and D. Whitwham. *Journal of Electrodepositors' Technical Society* (Reprint), v. 22, 1947, p. 24-28.

Method developed for the polishing of aluminum alloy sheet specimens in connection with corrosion research. Aim of experiments was the determination of the optimum conditions for polishing microsections.

11-39. The Application of Electrolytic Polishing to Ferrous Metallography. H. J. Merchant. *Journal of the Iron and Steel Institute,* v. 155, Feb. 1947, p. 179-194.

Effects of variable conditions of electrolysis when using Jacquet's perchloric acid, acetic anhydride electrolyte. The design of a suitable type of cell was investigated and five different cells were constructed. Electrolytic polishing is compared with mechanical polishing on the basis of procedure and results. Other potential solutions for electrolytic polishing were also investigated, and a list of recommended electrolytes is given. Various observations made in the course of this work are considered relative to the present theory of electrolytic polishing.

11-40. The Measurement of the Intensity Ratios of Spectral Lines With Electron Multiplier Phototubes. K. G. Kessler and R. A. Wolfe. *Journal of the Optical Society of America,* v. 37, March 1947, p. 133-144.

Some properties of electron-multiplier photo-tubes. The use of these tubes in quantitative spectrographic analysis is discussed, and a scheme for reducing the effect of dark current is described. An amplifier circuit for measuring the intensity ratios of spectral lines, and results of the application of this circuit to the analysis of chromium in steel.

11-41. Automatic Measurement of Sheet Metal Thickness by X-Ray. H. Seymour. *Petroleum,* v. 10, March 1947, p. 68-69.

The fluoroscopic-screen method first described by H. M. Smith of General Electric.

11-42. Optical Methods for Evaluation of Metal Surfaces. Arthur A. Vernon. *Metal Finishing,* v. 45, April 1947, p. 70-71.

Instruments now available for surface pictures; the reflection method.

11-43. Surface Roughness, Waviness and Lay. Part I. *American Machinist,* v. 91, April 10, 1947, p. 155.

Standard is concerned with the geometrical irregularities of surfaces of solid materials. Establishes definite classifications for various degrees of roughness and waviness, and for various varieties of lay. It deals only with their height, width, and direction.

11-44. Graphite Flake Type in Gray Cast Iron. *Metal Progress,* v. 51, April 1947, p. 616-B.

Standard charts of flake type and recommended procedure for determining flake size and type.

11-45. Metallographic Electropolishing. J. L. Waisman. *Metal Progress,* v. 51, April 1947, p. 606-610.

The mechanism of electrolytic polishing, the essential features of an electropolishing installation, and the factors entering into mechanical convenience. The installation and electrolytes used for the routine polishing of steels and aluminum alloys.

11-46. New Replica Techniques for Evaluating Engine Wear. *Automotive and Aviation Industries,* v. 96, April 15, 1947, p. 36-37, 78.

Two new replica methods of evaluating surfaces finishes of engine parts subject to wear. A National Bureau of Standards process is based on the use of a plastic replica which reproduces in minute detail the protuberances and recesses of a surface, and a photo-electric means of evaluation. The N.A.C.A. Aircraft Engine Research Laboratory method also uses a plastic replica, but the examination is made by a microscope.

11-47. Electrolytic Polishing of Metallographic Sections. L. P. Zaitzeva and L.

J. Popilov. *Engineers' Digest (American Edition)*, v. 4, April 1947, p. 194-195.

A comprehensive series of experiments on polishing of a number of constructional carbon steels, high and low carbon, and high and low alloy steels. (Abstracted from *Zavodskaja Laboratorija*, no. 7 and 8, 1946, p. 679-692.)

11-48. A New Method of Studying the Structure of Alloys by Magnetic Analysis. P. T. Hobson. *Nature*, v. 159, March 29, 1947, p. 436.

In testing of metal wires for ferromagnetism, using a cathode-ray oscilloscope, marked irregularities were noted in the curves of external field strength of rate of change of magnetic intensity, and in the hysteresis loop. It is believed that the irregularities are caused by structure inhomogeneity, hence use of the phenomena is suggested for study of alloy structure.

11-49. Preparation and Uses of Silica Replicas in Electron Microscopy. Charles H. Gerould. *Journal of Applied Physics*, v. 18, April 1947, p. 333-343.

The preparation of silica replicas and substrates and their many and varied uses. A method for preparing silica replicas of specimens which cannot be subjected to the temperatures and pressures of the ordinary technique consists of applying a polystyrene lacquer to the specimen surface in place of the conventional molding. Technique of dispersing the powder in an ethyl cellulose lacquer and depositing upon a silica substrate. Several other techniques included.

11-50. Trends in Electric Gaging Methods. Howard C. Roberts. *Instruments*, v. 20, April 1947, p. 326-330.

The development of electrical gaging systems. A general-purpose amplifying system designed by the author is applicable to pointer-type indicating instruments, low-impedance magnetic oscillographs, or cathode-ray oscillographs. Need for improvements along certain lines.

11-51. Surface Finish Measurement Instrumentation. James A. Broadston. *Instruments*, v. 20, April 1947, p. 374-377.

Advantages for production of metal parts and equipment. (To be continued.)

11-52. Locke Insulator Makes Wide Usage of Industrial Instruments. C. W. Bowden. *Instrumentation*, v. 2, April-May 1947, p. 3-5.

Several applications of instruments, including drying ovens, continuous kilns, alloy pots, and metallizing furnaces in the plant of Locke Insulator Corp., Baltimore.

11-53. Casting Quality Controlled by New Dilatometer. Carl M. King. *Instrumentation*, v. 2, April-May 1947, p. 25.

Use of new Dietert dilatometer and Brown electronic potentiometer in control of the sand used for molding in the metal foundry.

11-54. Basic Characteristics of Useful Industrial Laboratory Instruments. J. S. Buhler. *Iron Age*, v. 159, May 1, 1947, p. 58-61.

Tabulation of the most prominent or most used types giving the principles, construction, and outstanding uses.

11-55. Ultrasonic Measurement of Wall Thickness in Diesel Cylinder Liners. Francis W. Struthers and Horace M. Trent. *Journal of the Acoustical Society of America*, v. 19, March 1947, p. 368-371.

Modifications developed in order to adapt the Sonigage to the quick inspection of diesel cylinder liners. A method of introducing ultrasonic vibrations from a conventional flat-crystal probe into a curved surface and an adaptor for determining thickness by interpreting the harmonics response have proven to be useful. Use of technique yields much valuable information concerning the relative homogeneities of the castings.

11-56. De Beteekenis Van Het Electronen-Microscoop Voor Het Metaalonderzoek. (Application of Electron Microscope in Metallurgical Research.) Part II and III. H. C. J. De Decker. *Metalen*, v. 1, March 1947, p. 113-117; April 1947, p. 139-144

Surveys the different techniques of electron microscopic examination with special reference to their application in metallurgical research. Different types of electron microscopes, and their metallurgical use.

11-57. Interferometers. *Automobile Engineer*, v. 37, April 1947, p. 137-138.

Hilger instruments for comparative or absolute measurements of wavelengths of light.

11-58. A General-Purpose Debye-Scherrer Camera and Its Application to Work at Low Temperatures. William Hume-Rothery and D. J. Strawbridge. *Journal of Scientific Instruments*, v. 24, April 1947, p. 89-91.

An apparatus has been devised for accurately controlling the temperature of the specimen between room temperature and −110° C. Lattice spacing measurements of aluminum at temperatures down to −97.5° C. are in agreement with those calculated from the coefficent of expansion of the bulk metal.

11-59. Tracer-Point Sharpness as Affecting Roughness Measurements. D. E. Williamson. *Transactions of the American Society of Mechanical Engineers*, v. 69, May 1947, p. 319-323.

Test procedure proposed to show the differences in average roughness readings that are obtained on a variety of specimens using tracer points of different sharpness. Four diamond points were obtained in mounts to suit them for use in the common type of profilometer tracer. Measurement of average roughness on metal surfaces finished with abrasives can be satisfactorily carried out by tracer-point methods. Regardless of the smoothness of the piece, a tip radius of 0.0005 in. is adequate.

11-60. How to Detect "Gassing" of Metals by a Quick and Sensitive Test. Richard E. Frank. *Foote Prints*, v. 18, no. 2, 1947, p. 20-21.

Previous work has shown that ferrosilicons should be nongassing for use in welding electrode coatings. A simple qualitative test for determining the stability of ferrosilicon toward sodium silicate.

11-61. Economical Direct Current Source for Electrolytic Etching. J. G. Cutton. *Metal Progress*, v. 51, May 1947, p. 776.

Direct current supply is obtained by rectifying 110-v. a.c. by means of two selenium rectifiers. This gives 90-v. d.c. with no load, which drops to 5 v. when etching samples.

11-62. A Methyl Methacrylate - Silica Replica Technique for Electron Microscopy. A. F. Brown and W. M. Jones. *Nature*, v. 159, May 10, 1947, p. 635-636.

Technique in which methyl methacrylate polymer is formed from the liquid monomer poured over the surface of the specimen. It is applicable to both metallic surfaces and to biological materials.

11-63. Phase Contrast in the Photomicrography of Metals. F. W. Cuckow. *Nature*, v. 159, May 10, 1947, p. 639-640.

Successful applications of phase contrast in the vertical-illumination metallurgical microscope.

11-64. Measurement—Tool of Science and Industry. Hugh L. Dryden. *Instruments*, v. 20, May 1947, p. 435-437.

The purposes to be served in science and industry by measurement and some of the more recent trends in the development of instrumentation.

11-65. Abrasion Analysis of Protective Coatings. L. S. Barker. *Light Metal Age*, v. 5, May 1947, p. 25.

Technique employed to determine effectiveness of various coatings for aluminum and magnesium.

11-66. Heat Testing of Aluminum Coatings. S. H Philips. *Light Metal Age*, v. 5, May 1947, p. 26.

In order to protect aluminum alloys used in superspeed aircraft from the bad effects of high temperatures caused by air friction, coatings must be investigated for their heat absorption properties. Technique for evaluating this property.

11-67. A Remote Control Switch for Rocking Electric Melting Furnaces. R. J. Lean. *Machinery (London)*, v. 70, May 1, 1947, p. 457-462.

New instrument uses some unusual mechanical arrangements to provide the necessary control and a special testing and recording mechanism for checking the operation of new control instruments.

11-68. High-Temperature X-Ray Diffraction Apparatus. Alvin Van Valkenburg, Jr., and Howard F. McMurdie. *Journal of Research of the National Bureau of Standards*, v. 38, April 1947, p. 415-418.

A furnace for obtaining X-ray powder-diffraction patterns of sample at elevated temperatures. This furnace is used with the Norelco X-ray spectrometer, in which the photographic film is replaced by a Geiger counter. The assembly has several advantages over previously described high-temperature X-ray powder-diffraction cameras. Diffraction data for the alpha form of $2CaO \cdot SiO_2$.

11-69. Porosity of Electrodeposited Metals. A. E. S. Research Project No. 6. Part II. Critical Literature Review. (Continued.) N. Thon and E. T. Addison, Jr. *Monthly Review*, v. 34, June 1947, p. 722-730.

Hot water tests; tests for cathodic metal deposits; electrographic methods; salt-spray tests; and impregnation methods. (To be continued.)

11-70. The Use of an Underfeed Stoker Applied to a New Type of Assay Furnace. E. A. C. Rubidge. *Journal of the Chemical, Metallurgical and Mining Society*, v. 47, Feb. 1947, p. 300-316.

Design and operating details of furnace used in connection with large-scale assaying of gold ores.

11-71. Some Photographic Aspects of Industrial Radiography. Herman E. Seemann. *Industrial Radiography & Non-Destructive Testing*, v. 5, Spring 1947, p. 9-15.

The nature of radiation and the structure of a photographic emulsion. Practical information concerning recommended techniques.

11-72. A Proposed Pulsed X-Ray Generator for High Speed Diffraction Studies. D. M. McCutcheon, S. G. Knoch, and C. T. Waldie. *Industrial Radiography & Non-Destructive Testing*, v. 5, Spring 1947, p. 16-18, 20.

Instrument, it is believed, will solve the problem of the industrial application of X-ray diffraction, which has been severely hampered by the excessive time required in order to obtain a photographic record of the pattern.

11-73. The Radioactive Integrator, a New Area Measuring Instrument. Marietta Blau and Jack R. Carlin. *Industrial Radiography & Non-Destructive Testing*, v. 5, Spring 1947, p. 19-20.

Instrument uses polonium as a source of alpha particles; a few possible applications.

11-74. Testing Materials for Internal Discontinuities With Supersonic Echoes. J. W. Dice. *Industrial Radiography & Non-Destructive Testing*, v. 5, Spring 1947, p. 29-33.

Use of supersonic Reflectoscope.

11-75. Electrochemical Jet Test. A. Ogarev. *Metal Industry*, v. 70, May 9, 1947, p. 338-340.

A method for determination of thicknesses of electrodeposited coatings. A direct current is passed through the stream of liquid flowing through a capillary on to the sample, the latter being made the positive, and the capillary the negative, electrode. At the spot where the jet meets the sample, electrochemical solution of the plated metal takes place. When the base metal is exposed a marked change of current strength takes place, which indicates the end point. (Translated from a recent issue of *Journal of Applied Chemistry (U.S.S.R.)*.)

11-76. Adapt Electronic Digital Counters as Process Aid. *Electronic Industries & Electron Instrumentation*, v. 1, June 1947, p. 2-3.

How the above may be used.

11-77. Single Crystal Electron Diffraction by Microcrystalline Materials. Norman Davidson and James Hillier. *Journal of Applied Physics*, v. 18, June 1947, p. 499-511.

Reports on the phenomena observed using a mode of operation of the electron diffraction camera described by Hillier and Baker wherein a beam of electrons, reduced to a probe of approximately 200A cross section, and of maximum angular aperture approximately 7.5×10^{-3} radian, is diffracted by single microcrystals; and of correlating the morphology and orientation of a particular crystal with its diffraction patterns from single microcrystals.

11-78. Objective Aperture System for the Electron Microscope. Cecil E. Hall. *Journal of Applied Physics*, v. 18, June 1947, p. 588-589.

System is attached to the specimen cartridge rather than to the lens; procedures for its use. Advantages over the conventional system and representative results.

11-79. Polishing Metallographic Specimens With Diamond Dust. Gordon C. Woodside and Harold H. Blackett. *Metal Progress*, v. 51, June 1947, p. 945-947.

Grinding and polishing technique, using diamond dust pastes, in the preparation of carbide and other specimens.

11-80. Identification of Delta Constituent in Aluminum Bronzes. David J. Mack and M. A. Shurman. *Metal Progress*, v. 51, June 1947, p. 976-977.

Disadvantages of commonly used or recommended etching reagents are overcome by use of an "aged" NH_4OH-H_2O_2 solution.

11-81. Improved Ice Calorimeter in High-Temperature Research. *Technical News Bulletin (National Bureau of Standards)*, v. 31, June 1947, p. 63-65.

Instrument has the following desirable characteristics: First, its precision is very good; second, its sensitivity and thermal insulation are sufficiently high so that it may be used with accuracy for measurements of very small quantities of heat; third, it does not call for expensive temperature and electrical-power measuring equipment. The development of specific-heat standards of Al_2O_3 in the form of corundum, for high-temperature calorimetry.

11-82. A New Method for Making Rapid and Accurate Estimates of Grain Size. Frederick C. Hull. *Metals Technology*, v. 14, June 1947, T.P. 2160, 13 p.

Improved method for determining grain size of metals or alloys. It is based upon a comparison of the image of the sample on the ground-glass plate of a metallograph with a grain-size standard transparency illuminated by transmitted light.

11-83. The Factorial Experiment in Engineering Research. M. K. Barnett. *Metals Technology*, v. 14, June 1947, T.P. 2161, 12 p.

A technique for obtaining the maximum amount of useful information relating to the influence of various factors on a given property, for a minimum expenditure of time and effort. The usual practice of studying one variable at a time, while holding all others constant, is not followed. A factorial arrangement of experiments is productive of a greater amount of information for a given number of experiments. This conclusion is amply illustrated by means of several examples from metallurgical research. However, the treatment is equally applicable to all types of research.

11-84. Identification of CaO-MgO Orthosilicate Crystals, Including Merwinite ($3CaO \cdot MgO \cdot 2SiO_2$), Through the Use of Etched Polished Sections. R. B. Snow. *Metals Technology*, v. 14, June 1947, T.P. 2167, 15 p.

A technique for polishing and etching specimens of openhearth furnace slags or hearth aggregates for identification of the crystalline constituents. This method does not require the use of the petrographic microscope.

11-85. Surface Finish Measurement Instrumentation. James A. Broadston. *Instruments,* v. 20, June 1947, p. 570-572.

Requirements and problems involved.

11-86. Producing High Purity Metals With Vacuum. J. D. Nisbet. *Iron Age,* v. 159, June 19, 1947, p. 56-59.

Vacuum melting system in which a centrifugal-casting operation is performed, and in which an arrangement is provided for loading and making additions to the furnace without disturbing the vacuum. The step-by-step procedure in producing a 6-lb. "ingot" under less than 50 microns pressure, together with precautions to be observed.

11-87. Metals Through the Microscope. Peter R. Lewis. *Scientific American,* July 1947, p. 24-25.

Technique and applications of photomicrography.

11-88. A New Electron Microscope With Continuously Variable Magnification. J. B. le Poole. *Philips Technical Review,* v 9, no. 2, 1947, p. 33-45.

The principle of the electron microscope with particular reference to the focusing of electron beams by magnetic lenses. Description of a new electron microscope now in use at the Institute for Electron Microscopy at Delft. The resolving power amounts to about 25Å and the magnification is continuously variable from 1000 to 80,000.

11-89. A Note on the Effect at the Cathode of an Arc Between Copper Electrodes. Maurice Milbourn. *Proceedings of the Physical Society,* v. 59, March 1, 1947, p. 273-275.

Observations on burning arcs and on arced electrodes indicate that melting of a copper cathode does not necessarily take place, and that selective distillation of impurities occurs when melting is induced by the presence of a metal having powerful reducing properties. Volatilization of copper from the cathode appears to be effected through the formation of cuprous oxide.

11-90. A Simple Technique for the X-Ray Determination of Fiber-Axes in Electrodeposited Metals. M. R. J. Wyllie. *Review of Scientific Instruments,* v. 18, June 1947, p. 425-429.

A special camera designed for the above. A method of computing the numerical value of the fiber-axis of the oriented crystals from simple linear measurements on the films obtained using this camera.

11-91. Measurement of Depth of Cold Work on X-Ray Spectrometer. Michael Field. *Review of Scientific Instruments,* v. 18, June 1947, p. 451-453.

Technique developed.

11-92. The Preservation of Metallurgical Microspecimens. Henry Thompson. *Metallurgia,* v. 36, June 1947, p. 96.

Use of transparent resinous coatings.

11-93. Apparatus for Measuring Power Loss in Small Ferromagnetic Samples Subject to an Alternating Magnetic Field. K. H. Stewart. *Journal of Scientific Instruments,* v. 24, June 1947, p. 159-162.

Apparatus enables loss measurements to be made at known flux densities on flat strip specimens, about 15x1x0.03 cm., of soft magnetic materials such as transformer sheet steel.

11-94. A Laboratory Testing Machine for Helical Gear Tooth Action. Harry Walker. *Engineer,* v. 183, June 6, 1947, p. 486-488.

Details of construction, operation, and typical test results.

11-95. Applications of High Vacuum Equipment. *Machinery Lloyd (Overseas Edition),* v. 19, June 21, 1947, p. 90-93.

Applications and equipment in a variety of fields. An important and comparatively recent development is cathodic sputtering and evaporation for deposition of metals on miscellaneous nonmetallic materials.

11-96. How to Measure Surface Roughness of Castings. G. Hobman. *American Machinist,* v. 91, July 3, 1947, p. 94-95.

A simple instrument of the stylus type.

11-97. Controlling Casting Quality With a Dilatometer. Carl M. King. *Iron Age,* v. 160, July 3, 1947, p. 73-74.

How it assists foundryman in maintaining quality control by analyzing behavior of sand mixtures.

11-98. A Cathode-Ray B-H Tracer. Joseph Zamsky. *Electrical Engineering,* v. 66, July 1947, p. 678-680.

How the cathode-ray oscilloscope and associated equipment can be used for quantitative determination of magnetic properties without compensation for end effects. This equipment provides a method not only for obtaining core loss and permeability, but also for obtaining retentivity, coercive force, and degree of saturation of the test specimen.

11-99. Design of an Automatic Recording Dilatometer. Emerson S. Norris. *Electrical Manufacturing,* v. 40, July 1947, p. 106-107, 194, 196.

Instrument was developed for use in studying thermal-dilation rates of various materials. Electronic switching is used to control synchronous motor driving a recording potentiometer in place of usual time-drive.

11-100. High-Temperature X-Ray Diffraction. *Iron Age,* v. 160, July 10, 1947, p. 51, 128.

New equipment, using a Norelco X-

ray spectrometer in which a Geiger counter replaces the photographic film, may be used to obtain patterns at temperatures up to 2700° F.

11-101. Metallographic Identification of Sigma Phase in 25-20 Austenitic Alloy. G. N. Emmanuel. *Metal Progress*, v. 52, July 1947, p. 78-79.

The effect of various etching reagents and techniques on the appearance of sigma phase under the microscope on heating 1000 hr. at 1600° F.

11-102. Source of Polishing Scratches. David J. Mack. *Metal Progress*, v. 52, July 1947, p. 105-106.

Precautions to be followed to prevent abrasion in metallographic work.

11-103. The Automatic Sonigage. Wesley S. Erwin and Gerald M. Rassweiler. *Iron Age*, v. 160, July 24, 1947, p. 48-55.

Simple ultrasonic device that makes possible rapid nondestructive tests of many metal and plastic parts. Only one surface need be available to measure thickness, with less than 2% error. Thickness of tubes, as well as flat parts, between 0.005 and 0.250 in., may be read directly, and up to several inches, may be read indirectly. Solid parts may be inspected for flaws.

11-104. Une Méthode Electrolytique Rapide de Determination des Inclusions de Silice dans l'Acier. (Rapid Electrolytic Method of Determination of Silica Inclusions in Steel.) Adam Skapski, Adam Bielanski, and Marek Sobieski. *Revue de Metallurgie*, v. 43, July-Aug. 1946, p. 229-233.

A newly developed method for determining silica inclusions, consisting of a combination of electrolytic and analytical methods. The time for determination is about 3 hr. In comparison with the bromine method, the new one is considered excellent.

11-105. Les Principales Maladies De La Malleable A Coeur Noir Et Leur Diagnostic Micrographique. (The Principal Defects in Black-Heart Malleable Iron and Their Micrographic Diagnosis.) Henri Laplanche. *Fonderie*, no. 14, Feb. 1947, p. 507-526.

A method for rapid determination of anomalies arising during the process of graphitization and methods for overcoming the difficulties. 13 ref.

11-106. Measures Contours of Surfaces. F. R. Nitchie, Jr. *Machine Design*, v. 19, July 1947, p. 136.

Mechanical instrument developed to measure the dimensions of marine propellers to tolerances much smaller than those generally accepted. This instrument should prove useful for any application requiring the measurement of radial or concentric cylindrical contours or sections, particularly of irregular surfaces.

11-107. The Determination of Pipe Protection by the Continuous Polarity Method. Wm. E. Huddleston. *Corrosion*, v. 3, July 1947, p. 325-330; discussion, p. 330.

Technique illustrated by three examples. Procedure used in making repairs in wrapped pipe coating.

11-108. Instrument Development in Research. *Aircraft Production*, v. 9, July 1947, p. 252-255.

Measurement by electrical and electronic methods in the Napier aircraft-engine laboratories. New instruments devised include a device for remote measurement of small movements without loading the part under investigation, an aeration meter, a detonation indicator, and an engine-testing set and its calibration.

11-109. Technique of X-Ray Powder Photography. H. P. Rooksby. *Nature*, v. 160, July 5, 1947, p. 7-9.

Descriptive. 11 ref.

11-110. Report of Committee A-6 on Magnetic Properties. *American Society for Testing Materials Preprint 5*, 1947, 8 p.

Proposed tentative methods for permeability of paramagnetic materials, and tentative specifications for flat-rolled electrical steel.

11-111. Report of Committee B-4 on Electrical Heating, Resistance, and Related Alloys. *American Society for Testing Materials Preprint 11*, 1947, 12 p.

Proposed tentative method for measuring residual stress in cylindrical metal-to-glass seals and proposed tentative methods of testing fine round and flat wire for electronic devices.

11-112. A New Differential Manometer. A. Lerner and A. Makasov. *Industrial Power (U.S.S.R.)*, v. 4, no. 2, 1947, p. 11-12. (In Russian.)

Recording manometer for furnaces indicates pressure differences as small as 0.1 mm. H_2O.

11-113. Radiographie Electronique de Minerais. (Electronic X-Ray Investigation of Minerals.) Charles Legrand and Jean-Jacques Trillat. *Comptes Rendus*, v 224, March 31, 1947, p. 1000-1001.

A new method of X-ray investigation by reflection (using the secondary electrons given off under the effect of penetrating X-rays) may be applied in the determination of the composition of minerals.

11-114. Methodiek en Resultaten van het Electronen-Microscopisch Onderzoek van Metalen. (Methods and Results of Electron Microscopic Investigation of Metal Surfaces.) D. L. Ingelse. *Metalen*, v. 1, May 1947, p. 155-157.

A method by which suitable replicas for electron-microscope observation of etched metal surfaces are prepared.

Results for heat treated steel and aluminum compared with those obtained with ordinary microscopic observations

11-115. Electric Positioning Systems of High Accuracy for Industrial Use. D. E. Garr. *General Electric Review,* v. 50, July 1947, p. 17-24.

The components of such systems in chemical plants and steel mills.

11-116. Tracer Micrography Developed. *Chemical and Engineering News,* v. 25, July 21, 1947, p. 2073.

Method for studying the concentration of radioactive isotopes.

11-117. Methodiek En Resultaten Van Het Electronen-Microscopisch Onderzoek Van Metalen. (Methods and Results Obtained in Electron Microscope Study of Metals.) (Continued.) L. Ingelse. *Metalen,* June 1947, p. 181-188.

Illustrated by numerous photomicrographs. (To be continued.)

11-118. Primaretsning av Svetsgods. (Primary Etching of Welds.) Erik Magnusson. *Jernkontorets Annaler,* v. 131, no. 6, 1947, p. 212-224.

Recommendations for reagents and procedures, and for preliminary quenching and tempering to produce a finer microstructure. The mechanism of etching.

11-119. Examen Micrographique de Textures Orientees sur Aluminium Lamine. (Micrographic Examination of the Textures of Sheet Aluminum.) J. Herenguel and F. Santini. *Metaux et Corrosion,* v. 21, Oct-Nov. 1946, p. 131-136.

An electropolishing process in use for aluminum of industrial purity and a selective method of attack which reveals the grain boundaries. This method was used to study sheet iron made from ingots having a highly developed basaltic texture.

11-120. Application du Monochromateur a Lame Courbe a l'Identification et au Dosage des Phases dans les Alliages Metalliques. (Application of the Monochromator for Curved Specimens to the Identification and Determination of Phases in Metallic Alloys.) Rene Faivre. *Metaux et Corrosion,* v. 21, Feb. 1947, p. 21-27.

New monochromator for the study of curved specimens of complex metal alloys.

11-121. Two Calculating Machines for X-Ray Crystal Structure Analysis. A. D. Booth. *Journal of Applied Physics,* v. 18, July 1947, p. 664-666.

Two mechanisms have proved of great service in several analyses. The simpler of the devices is of general application and can be constructed with comparatively limited workshop facilities.

11-122. An Electronic Computer for X-Ray Crystal Structure Analyses. R. Pepinsky. *Journal of Applied Physics,* v. 18, July 1947, p. 601-604.

The instrument sums the two-dimensional Fourier series representing planar, centro-symmetric projections of electron densities in a crystal unit cell. Projection is by a television scan on the screen of a cathode-ray oscilloscope. The specific advantage of the device is the immediate observability of effects on the projection of alterations in signs of one or any number of Fourier coefficients.

11-123. New Accuracy Attained in Gaging Metal Wear. *Aviation Week,* v. 47, Aug. 4, 1947, p. 21-22.

New diamond indentation method developed at National Bureau of Standards.

11-124. Precision Measurement. Section II. Instrument Inspection. Part 13. Measurement of Threads and Gears. Warren Baker. *Machine and Tool Blue Book,* v. 43, Aug. 1947, p. 207-210, 212-218, 220, 222, 224.

Standard designations of threads; glossary; measurement methods; formulas; measuring external, internal and helical gears.

11-125. A Carburizing Experiment With Radioactive Carbon. J. K. Stanley. *Metal Progress,* v. 52, Aug. 1947, p. 227-229.

How radioactive carbon was introduced into iron by means of radioactive $BaCO_3$, which contains the C^{14} isotope. Using this material as a carburizer enables a test to be made of current theories about the mechanism of carburization and the action of so-called energizers.

11-126. New Metallurgical Techniques and New Alloys of Magnesium. J. C. McDonald. *Metal Progress,* v. 52, Aug. 1947, p. 243-248.

Concluding part of a paper read before Western Metal Congress. Improved etchants that develop grain size and distinguish between tiny casting voids and microporosity, and also can correlate composition, ultra-fine structure, and corrosion behavior. New alloys with zirconium and cerium.

11-127. Bits and Pieces. *Metal Progress,* v. 52, Aug. 1947, p. 248-250.

Projector for microscope images used, by Arthur R. Watson. Making an expansion fit, by Avery C. Jones. Testing hardness up to 700° F., by A. L. Pranses. Mount identification tool, by O. L. Noftsinger, and Distinguishing the Be-Cu alloys, by Frank C. Bennett, Jr.

11-128. Metallography of Hot Dipped Galvanized Coatings. D. H. Rowland. *American Society for Metals Preprint*

No. 18, 1947. (To be published in *Transactions* for 1948.)

A new metallographic etching reagent for galvanized coatings demonstrates that the alloy layer of galvanized coatings contains all of the phases shown by the Schramm iron-zinc constitution diagram at the temperature level of commercial coating practice. Thickness measurements and microhardness values of the various phases.

11-129. Multiple Correlation Applied to Steel Plant Problems. W. T. Rogers. *American Society for Metals Preprint No. 27,* 1947, 16 p. (To be published in *Transactions* for 1948.)

The application of multiple correlation methods to four different types of problems encountered in a large steel plant. Its purpose is to show the versatility of this type of analysis and to point out the practical results which have been obtained by its use.

11-130. Detection of As-Cast Austenite Grain Size in Heat Treated Cast Alloy Steels. Edward A. Loria. *American Society for Metals Preprint No. 28,* 1947, 15 p. (To be published in *Transactions* for 1948.)

A method for measuring the as-cast austenite grain size in cast alloy steels by considering the effects of solidification pattern and segregation of alloying elements on the development of the as-cast grain pattern.

11-131. Relative Thickness of Lead, Concrete, and Steel Required for Protection Against Narrow Beams of X-Rays. George Singer, Harold O. Wyckoff, and Frank H. Day. *Journal of Research of the National Bureau of Standards,* v. 38, June 1947, p. 665-672.

Determined experimentally using a pressure ionization chamber and an X-ray tube to which constant potential was applied. Agreement with other laboratories is satisfactory. 14 ref.

11-132. Les Essais Aux Ultra-sons. (Tests Using Ultrasonic Vibrations.) C. H. Desch. *Revue de Metallurgie,* v. 43, Sept-Oct. 1946, p. 253-256.

Various methods by which supersonic waves are used to detect cracks and other defects in metals. Other industrial uses for supersonic waves. 14 ref.

11-133. A Microhardness Tester. H. Lloyd. *Journal of Scientific Instruments,* v. 24, July 1947, p. 186-189.

An instrument of simple design for measuring the hardness of a material at microscopically determined points on its surface. Its construction, calibration and use.

11-134. Mechanism of Thermal-Shock Failure in Enamelware; an Oven-Test Method. J. C. Richmond and W. N. Harrison. *Journal of the American Ceramic Society,* v. 30, Aug. 1, 1947, p. 227-236.

Enameled utensils were tested by heating in an oven to a predetermined temperature, then quenching with ice water. This process was repeated for successively higher temperatures from 375 to 600° F. until the specimens chipped or withstood heating after the tenth quench. Failures originate in cracks formed during quenching from stresses produced by rapid cooling and shrinking of the surface of the enamel.

11-135. Stereoscopic Drawings of Crystal Structures. W. L. Bond. *American Mineralogist,* v. 32, July-Aug. 1947, p. 454-461.

A method for getting stereoscopic pairs of atomic structure views given the coordinates of the atoms and cell constants.

11-136. Ultrasonic Measurements on Single Crystals. H. B. Huntington. *Physical Review,* v. 72, Aug. 15, 1947, p. 321-331.

An ultrasonic pulse technique has been applied to measure the mechanical properties of some single crystals at 10 mc. per sec. Attenuation in alkali-halide single crystals is small. Internal friction in the copper single crystal is high in comparison with that found at lower frequencies, even for unannealed specimens. Attenuation in Rochelle salt is also quite high. 24 ref.

11-137. Microscopical Examination as a Guide to Quality in Engineering Tin Bronzes. W. T. Pell-Walpole. *Metal Treatment,* v. 14, Summer 1947, p. 69-83.

Microscopic studies of the effects of heat treatment, working, segregation, and porosity on the microstructures of bronzes of various compositions.

11-138. High-Temperature Furnace for Electron Diffraction Studies. Earl A. Gulbransen. *Review of Scientific Instruments,* v. 18, Aug. 1947, p. 546-550.

A furnace for use with the electron diffraction camera for the study of chemical and physical reactions occurring on surfaces up to 1000° C.

11-139. A High-Temperature X-Ray Diffraction Apparatus. L. S. Birks and H. Friedman. *Review of Scientific Instruments,* v. 18, Aug. 1947, p. 576-580.

An apparatus for heating an X-ray specimen to 1200° C. in vacuum while its diffraction pattern is being recorded continuously on a Geiger-counter spectrometer. The heater consists of a length of 0.030-in. tungsten wire embedded in beryllium oxide, the whole enclosed in a polished tantalum case. Either a flat metal sheet or powder packed in platinum gauze mounted on sheet metal is suitable as a specimen.

Rapid structure changes may be observed as they occur with this apparatus.

11-140. Electrolytic Polishing. *Journal of the Iron and Steel Institute,* v. 156, Aug. 1947, p. 524-526.

A simplified anode connection discussion by James Pow of paper by H. J. Merchant (Feb. issue). Author's comments.

11-141. Electronic Comparators. *Automobile Engineer,* v. 37, Aug. 1947, p. 310-312.

Stress effects, dimensional comparisons, and special applications.

11-142. Electroplating Control Laboratory. H. J. Sedusky and J. B. Mohler. *Metal Finishing,* v. 45, Sept. 1947, p. 60-63.

Necessary equipment and procedures. (To be continued.)

11-143. Methods Used in the Preparation of Test Specimens. G. L. Smith. *Sheet Metal Industries,* v. 24, Aug. 1947, p. 1609-1614; Sept. 1947, p. 1809-1814, 1824.

The identification marking of specimens; methods for preparing metallographic specimens; preparation of samples for analysis. (To be concluded.)

11-144. High-Frequency Permeability of Ferromagnetic Materials. G. Eichholz and G. F. Hodsman. *Nature,* v. 160, Aug. 30, 1947, p. 302-303.

A method for measuring the effective reversible permeability of ferromagnetic materials in wire form over a fairly wide range of frequencies; results for several metals.

11-145. Methodiek en Resultaten Van Het Electronen-Microscopisch Onderzoek Van Metalen. (Method and Results of Electron-Microscopic Investigation of Metals.) D. L. Ingelse. *Metalen,* v. 1, July 1947, p. 203-206.

Concluded

11-146. Measurement by Induction Heating of the Temperature Variations of the Specific Heats of Ferromagnetic Materials. G. J. Aitchison. *Journal of Scientific Instruments,* v. 24, Aug. 1947, p. 200-202.

In a suitably designed high-frequency induction furnace, it was possible to supply heat to a specimen at a rate which remained approximately constant over a wide temperature range. By measuring the rates of temperature rise at different temperatures, and correcting for cooling, graphs were prepared showing approximately the variation of specific heat with temperature. 12 ref.

11-147. High Vacuum Technology. Richard S. Morse. *Industrial and Engineering Chemistry,* v. 39, Sept. 1947, p. 1064-1071.

Recently developed equipment and process plants which employ pressures in the micron range. Discussion is limited to industrial applications at 10^{-5} to 10^{-1} mm. in such fields as dehydration, metallurgy, distillation, metal evaporation. Operating data. 24 ref.

11-148. Mikroradiografie. (Microradiography.) Rudolf Pospisil. *Hutnické Listy,* v. 1, March 1947, p. 193-197.

Principles and procedures of radiography using X-rays and the advantages of the use of photo-electrons or microradiography. The latter proved to be more sensitive in distinguishing elements of different atomic numbers than the older absorption method.

11-149. Röntgenografie Kovu a Slitin. (X-Ray Examination of Metals and Alloys.) Petr Skulari. *Ceskoslovenské Hute n. p. Hutnické Listy,* May 1947, 27 p. (Supplement No. 1 to May 1947 issue of *Hutnické Listy.*)

The methods and apparatus used, and its advantages and disadvantages. Relationships between the structure and properties of metals and alloys. Practical examples from experience in the study of the disintegration of solid solutions. Dependence of mechanical properties on structure and the control of the production of aluminum by X-ray methods.

11-150. Use of a Temperature-Gradient Instrument in Investigating Austenite Decomposition of Alloy Steels. N. E Karskii and V. V. Balakin. *Factory Laboratory (U.S.S.R.),* v. 13, July 1947, p. 840-844. (In Russian.)

The lower part of a rod-shaped specimen is first quenched by dropping it from a vertical tube furnace into water while the upper part remains in the hot zone. After a further period, the rest of the rod is quenched; thus the middle section shows the effects of a complete range of temperatures in one specimen. Results of investigation of a Cr-Ni-Mo steel.

11-151. An Attempt to Find a Universal Etchant for Studying the Microstructure of Nonferrous Metals and Alloys. M. I. Makushenko. *Factory Laboratory (U.S.S.R.),* v. 13, July 1947, p. 845-847. (In Russian.)

Solutions of phosphoric acid containing traces of chromic anhydride were found to be suitable for the majority of the nonferrous metals.

11-152. Laboratory High-Frequency Generator for Tempering and Melting Metals. Iu. M. Bogatyrev and M. B. Berezhinskii. *Factory Laboratory (U.S.S.R.),* v. 13, July 1947, p. 890-891. (In Russian.)

Circuit diagram and apparatus with output of 4 to 5 kva.

11-153. New Testing Device for Haber-Type Dynamometer. V. I. Chevkinov. *Factory Laboratory (U.S.S.R.),* v. 13, July 1947, p. 892. (In Russian.)

Device described and diagrammed. Typical results.

11-154. Quantitative Metallography by Point-Counting and Lineal Analysis. Robert T. Howard and Morris Cohen. *Metals Technology,* v. 14, Aug. 1947, T.P. 2215, 14 p.

Literature on methods for measuring the relative amounts of microconstituents. Point-counting and the Hurlbut counter using austenite-martensite structures as samples. It is shown that both methods are reliable, whereas visual estimates may lead to erroneous results. Linear analysis with the Hurlbut counter is shown to be superior to point-counting in several respects. 28 ref. (Presented at New York Meeting of A.I.M.E., March 1947.)

11-155. Drop Test for Determining Thickness of Zinc Coatings. Richard Springer. *Monthly Review,* v. 34, Oct. 1947, p. 1147.

Simple method widely used in Germany during the past several years.

11-156. Measurement of Thickness of Copper and Nickel Plate. G. B. Bowman. *Monthly Review,* v. 34, Oct. 1947, p. 1149-1151.

Results of comparison of thickness measurements by three methods (microscopic, chemical, and magnetic). Two different commercial instruments were used for the magnetic determination of copper thickness.

11-157. Apparatus for Air Classification of Metal Powders. E. C. Truesdale. *Metal Powder Association Preprint,* 1947, 14 p.

Laboratory instrument based on air elutriation which was found to be capable of accurate fractionation at particle diameters up to 40 microns for spherical particles and to give reproducible results for spherical or nonspherical particles (excepting flakes) up to 75 microns. Modification of the apparatus permitted conversion to a continuous-feed multiple-stage classifier which was capable of sharp particle-size cuts at favorably high-recovery of fines. Results obtainable with each apparatus for a variety of metal powders.

11-158. Dosage d'Eléments Chimiques au Moyen des Spectres d'Etincelle Avec Emploi de Papier Comme Support de la Substance a Analyser. (Analysis of Chemical Elements by Means of Spark Spectra Using Paper as a Support for the Substance to be Analyzed.) Alain Berton. *Comptes Rendus,* v. 225, Aug. 4. 1947, p. 289-290.

It is claimed that ordinary spectrographic techniques do not give accurate quantitative results, because of the irregularity of light emission. To regularize the emission, the equipment was immersed in a regular flow of an aerosol solution. Paper is impregnated with the substance to be analyzed and the arc is passed. Results are quite accurate.

11-159. Chemical State of the Surface of Aluminum and Measurements of the Solution Potential. P. Morize, P. Lacombe, and G. Chaudron. *British Chemical Digest,* v. 1, Sept. 1947, p. 456-458.

Development of a method for defining quantitatively the chemical state of aluminum surface. This was done by measuring solution potential following mechanical and electrolytic polishing This gives an oxide-free surface suitable for accelerated corrosion tests if the bath is in good condition. Solution-potential measurement also indicates the thickness of oxide films. (Translated from *Journes des Etats de Surface,* 1946.)

11-160. Testing Circular Division With Precision Polygons. C. O. Taylerson. *Machinery (London),* v. 71, Sept. 18, 1947, p. 327-330, 333.

Use of precision-made 12-sided polygons for checking precision angular-measuring instruments.

11-161. Nondestructive Methods for Determining Metal Plate Thickness. J. G. Kerley. *Corrosion,* v. 3, Oct. 1947, p. 467-481.

Principles and procedures for use of methods utilizing supersonic vibration; thermal conductivity; magnetic characteristics; electrical resistance; electrical induction; and penetrating radiation (X-rays or gamma-rays). 20 ref. (Presented at Annual Meeting of N.A.C.E., Chicago, April 7-10, 1947.)

11-162. L'Analyse Chimique par Spectrographie D'Emission. (Chemical Analysis by Emission Spectrography.) E. Loeuille. *Métaux et Corrosion,* v. 22, April 1947, p. 61-66.

Concluded.

11-163. Applications of Electronic Methods to the Measurement of X-Ray and Gamma Ray Intensities. Herbert Friedman. *Industrial Radiography & Non-Destructive Testing,* v. 6, Summer 1947, p. 9-20.

Modes of operation of the counters and of the photomultiplier X-ray detector, their fundamental efficiencies, their noise characteristics, and their speeds of response. Examples of their applications include strip-metal gaging; measurement of thin coatings; determination of wall thickness of curved sections from one side; liquid-

quantity gaging, and X-ray-fluorescence and absorption methods of chemical analysis.

11-164. The Electron Microscope. James Hillier. *Industrial Radiography & Non-Destructive Testing*, v. 6, Summer 1947 p. 25, 28-31.

The instrument, its uses, and techniques employed.

11-165. The Influence of Inherent Filtration of the X-Ray Tube in Industrial Radiography and Fluoroscopy. E. D. Trout and A. L. Pace. *Industrial Radiography & Non-Destructive Testing*, v 6, Summer 1947, p. 32-39.

Two papers. One on the theoretical and physical aspects of the inherent filtration of the X-ray unit when used for industrial applications. The second on the influence of inherent filtration on the practical aspects of radiography in the field of high voltage.

11-166. Film Blackening Method for the Measurement of Relative X-Ray Intensities. Donald T. O'Connor. *Industrial Radiography & Non-Destructive Testing*, v. 6, Summer 1947, p. 40-43.

Each of the variables involved in the above process. Recommended techniques. 13 ref.

11-167. Sliding Scales to Increase the Usefulness of Radiographic Exposure Charts. G. M. Corney. *Industrial Radiography & Non-Destructive Testing*, v. 6, Summer 1947, p. 44-46.

Use of scales made on the slide-rule principle to correct for variations in type of film used, film density, and focus-film distance.

11-168. A Densitometer of Unusually High Sensitivity. Monroe H. Sweet. *Industrial Radiography & Non-Destructive Testing*, v. 6, Summer 1947, p. 47-48.

Electron-multiplier-tube densitometer with a linear density scale over a range of 0 to 3.0, and a total range of 0 to 6.0.

11-169. The Application of Etch-Figures on Pure Aluminium (99.99%) to the Study of Some Micrographic Problems. Paul Lacombe and Louis Beaujard. *Journal of the Institute of Metals*, v. 74. Sept. 1947, p. 1-16. (Translated from the French.)

Use of an electrolytic polishing method to reveal etch-figures in a particularly clear manner. This method has enabled the relative orientations between adjacent crystals to be related to the nature of the grain boundaries, to recrystallization due to heat treatment, and to mutual plastic deformations of two adjoining crystals. Single crystals of aluminum are shown to be composed of an aggregate of little crystalline "blocks" whose orientations are very slightly, but perceptibly, different. 28 ref.

11-170. Continental Wartime Developments in Spectroscopic Technique. Ernest H. S. Van Someren. *Journal of Scientific Instruments*, v. 24, Sept. 1947 p. 225-230.

Review of apparatus, light sources, technique, methods, and scope.

11-171. Note on a Simple Galvanometer With Negative Feedback. D. K. C. MacDonald. *Journal of Scientific Instruments*, v. 24, Sept. 1947, p. 232-233.

Based on Preston's earlier design of a galvanometer amplifier using a high degree of parallel negative feedback, a simple circuit using series feedback proves most suitable for measurements of small potentials as in metallic conductivity experiments. How the performance equations may be quickly derived for both systems.

11-172. A Twelve-Channel Recorder for Use With Resistance Strain Gages. A. Watson. *Journal of Scientific Instruments*, v. 24, Sept. 1947, p. 239-242.

In the 12-channel system, off-balance voltage is amplified and rectified and the spot deflection on the 12 cathode-ray tubes continuously recorded photographically. Deflections are measured directly from the film with a traveling microscope.

11-173. Instrumentation—Important Chapter of Chevrolet Story. *Instrumentation*, v. 3, 4th Quarter, 1947, p. 8-9

Described and illustrated.

11-174. Electron Microscopy. R. A. Scott. *Science Progress*, v. 35, Oct. 1947, p. 638-651.

Technique, including interpretation of results.

11-175. Automatic Ignition Cycle Simplifies Die-Cast Metal Production. Robert Miller. *Industrial Heating*. v. 14, Oct. 1947, p. 1615-1616, 1642.

Use of control system.

11-176. Furnace Atmospheres for Sintering. (Concluded.) Part IV: Gas Analyzers. H. M. Webber and A. G. Hotchkiss. *Industrial Heating*, v. 14, Oct. 1947, p. 1618, 1620, 1622, 1654, 1656.

Various types of analyzers and their advantages and disadvantages for use in the control of sintering atmospheres.

11-177. Spectrographic Slag Control. *Industrial Heating*, v. 14, Oct. 1947, p. 1661.

Review of paper by J. W. Woodruff presented at 30th Annual Open Hearth Conference of the A.I.M.E.

11-178. Macro-Etching and Photomacrography of Ferritic and Austenitic Welded Joints in Low-Alloy Steel. O. O. Miller and E. G. Houston. *Welding Journal*, v. 26, Oct. 1947, p. 620s-625s.

Procedures are designed to show the position, size, and macrostructure of weld metal in the several passes and

to indicate the various macrostructural zones of the heat-affected region of base metal. Emphasis is placed on light macro-etching of a highly polished surface. A procedure for photographing fractured surfaces. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

11-179. Measuring by Electron Microscopy. E. F. Fullam. *General Electric Review,* v. 50, Oct. 1947, p. 18-21.

Methods for calibrating magnification and correcting image distortion, essential factors in obtaining accurate measurements with the electron microscope. 14 ref.

11-180. Humidity Measurement by a New System. W. F. Hickes. *Refrigerating Engineering,* v. 54, Oct. 1947, p. 351-354, 388.

Instrument called the "Dewcel" consists essentially of a temperature-sensitive winding contained in a stainless-steel tube carrying a lithium-chloride-impregnated glass wick and silver conductors. Various advantages and potential applications, for instance controlling the moisture content of blast-furnace air supply.

11-181. Bore-Diameter Checking Method. C. H. Borneman. *Machinery,* v. 54, Oct. 1947, p. 182.

Instrument for checking bore diameters in long cylinders described in the Dec. 1945 issue gives readings that are somewhat inaccurate.

11-182. A Technique for Estimating Precision of Measurement. Fred Trowbridge. *Instruments,* v. 20, Oct. 1947, p. 959-960.

Statistical technique for evaluating the precision of a measuring setup.

11-183. Applied Photography. James F. Driver. *Machinery Lloyd (Overseas Edition),* v. 19, Oct. 11, 1947, p. 68-71.

Application to all sorts of problems such as motion study, photo-elastic analysis, radiography, television, spectrography.

11-184. Technical Data on Electronic Micrometer. *Electronics,* v. 20, Nov. 1947, p. 172, 174, 176, 178, 180.

Instrument with accuracy of better than 0.00005 in., developed by Bureau of Standards for measuring thickness of insulation on metal surfaces.

11-185. Separation of Nonmetallic Inclusions From Stainless and Acid Resistant Steels. S. I. Malov. *Factory Laboratory (U.S.S.R.),* v. 13, April 1947, p. 492-494; discussion, p. 494. (In Russian.)

Recommends an acid solution method rather than the customary electrolytic solution method, since carbides are said to be completely destroyed, and silicates partially, by the latter method. Data on the content and composition of inclusions in three Soviet steels. Editor's note doubts efficacy of method.

11-186. Etching of Metallographic Specimens by Heating. A. Ts. Spektor. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 630-631. (In Russian.)

Simple method involving heating until color begins to appear, followed by quenching, brings out the contrast between the ferrite and cementite zones of steel.

11-187. "Surface Analyzer" for Estimation of Roughness. M. M. Tennenbaum. *Factory Laboratory (U.S.S.R.),* v. 13, May 1947, p. 635-637. (In Russian.)

Motion of a needle point over the surface of the specimen is amplified by two piezo-elements and recorded graphically by a moving pen. Curves produced by the instrument and true surface profiles are presented in pairs for several types of surfaces. Reason for differences is explained on the basis of the finite dimensions of the needle point

11-188. Electrodynamic Coercimeter. M. A. Grabovskii. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 702-707. (In Russian.)

A new apparatus for rapid determination of the Curie point of ferromagnetic materials. Comparison with the usual method. Accuracy is 2 to 3% and time required is 30 to 45 sec.

11-189. Method for Determination of Changes in Length at High Temperatures. I. Ia. Zalkind, A. V. Anan'in, and P. N. Manuilov. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 707-709. (In Russian.)

New apparatus and method is very simple in construction and permits automatic recording of length changes corresponding to temperature changes up to 1200° C. Operation is by a combination of pneumatic, mechanical, and electrical systems.

11-190. Cathode-Ray Recording Micrometer and Force Gage. J. Ewles and C. Curry. *Journal of Scientific Instruments,* v. 24, Oct. 1947, p. 261-265.

Device uses a cathode-ray oscillograph in connection with a moving-coil system to record and measure rapidly varying movements of the order of 3 mm. to an accuracy of 0.0025 mm. by attaching the moving coil to a specially designed force gage of natural period of about 0.0002 sec. The device was used to record and measure rapidly varying forces and in a preliminary study of rapid shear.

11-191. A Simple Scanner for X-Ray Diffraction. Robert H. Hay. *Review of Scientific Instruments,* v. 18, Oct. 1947, p. 801-802.

Simple yet effective scanner which fits directly onto the track of the General Electric XRD unit. The device is especially useful for superimposing on one film the patterns from many grains in metallic samples.

11-192. Limits of Precision in the Determination of Lattice Parameters and Stresses by the Debye-Scherrer Method. Hans Ekstein and Stanley Siegel. *National Advisory Committee for Aeronautics Technical Note No. 1375,* Oct. 1947, 24 p.

The spectral width of the characteristic radiation is the limiting factor when the geometric line width has been sufficiently reduced. The intensity distribution in the line is calculated for the case of sufficiently large perfect crystal grains, negligible geometric width, and uniform angular distribution of the grains. Experiments were performed with copper radiation on zinc samples. Photographs taken with samples of different crystal grain sizes show the transition from the jagged to the theoretical, smooth intensity curve.

11-193. High-Speed Movies Trace Cause of Wear. *Machinery,* v. 54, Nov. 1947, p. 164.

Four frames show how indexing pawl rebounded from ratchet-wheel tooth before coil spring restored contact, resulting in rapid wear.

11-194. Photographing Cooling Curves of Hardening Oils by Means of a Cathode-Ray Oscillograph. *Philips Technical Review,* v. 9, no. 5, 1947, p. 147-148.

In attempting to compound a quenching oil having more satisfactory properties than colza oil and mineral oil, it was necessary to develop a method for studying the course of the cooling process. Use was made of a solid silver ball 20 mm. in diameter, containing a thermocouple to which the heat of the silver is well conducted. The ball is heated to about 800° C., and then immersed in the oil to be tested. Temperature recording over the extremely short times involved is done by visually recording the e.m.f. of the thermocouple on the screen of a cathode-ray oscillograph and photographing the picture. (Based on paper by B. Levy, *Electronic Measuring,* v. 1, no. 4, 1946.)

11-195. Acceptance Sampling by Variables, With Special Reference to the Case in Which Quality Is Measured by Average or Dispersion. John H. Curtiss. *Journal of Research of the National Bureau of Standards,* v. 39, Sept. 1947, p. 271-290.

Theory and practice of certain types of acceptance-sampling plans based on statistical tests of hypotheses. Basic concepts are discussed in detail, and then applied to obtain a number of specific formulas for the single sampling case.

11-196. Progress in Industrial Instrumentation. G. W. Tall, Jr. *Engineers' Digest (American Edition),* v. 4, Oct. 1947, p. 450, 492.

A general discussion.

11-197. Testing Circular Division With Precision Polygons. C. O. Taylerson. *Machinery Lloyd (Overseas Edition),* v. 19, Oct. 25, 1947, p. 68-72.

An optical method for testing the accuracy of the circular scales of engineers' angular measuring instruments such as dividing heads and tables.

11-198. Variable-Frequency Metals Comparator. D. E. Bovey. *General Electric Review,* v. 50, Nov. 1947, p. 45-49.

Apparatus for rapid checking of both magnetic and nonmagnetic materials for hardness, composition, or heat treatment at frequencies from 50 to 10,000 cycles per second.

11-199. An X-Ray Method of Measuring Poisson's Ratio. R. F. Hanstock and E. H. Lloyd. *Institution of Mechanical Engineers Proceedings,* v. 157, War Emergency Issue No. 26, 1947, p. 52-54; discussion, p. 55.

The specimen, which is a small tensile-test piece, is examined at various loads by a high-angle, "back-reflection", X-ray technique. Experimental results for the aluminum alloy Hiduminium RR.56. The method has the advantage of providing values which apply to a single set of crystallographic planes in a polycrystalline metal.

11-200. Measurement of Thickness of Oxide Coatings on Aluminum Alloys. Ralph B. Mason and William C. Cochran. *ASTM Bulletin,* Oct. 1947, p. 47-51.

Results using an electrical instrument known as the Filmeter compared with those obtained by the microscopic and the stripping methods.

11-201. Logarithmic Scales of Odd Lengths. *Metal Progress,* v. 52, Nov. 1947, p. 810-811.

How to use the sliding part of a slide rule to determine exact values from a logarithmic chart with comparatively large subdivisions.

11-202. A Temporary Holder for Polishing Metal Specimens. Henry Leidheiser, Jr. *Metal Progress,* v. 52, Nov. 1947, p. 811.

Plastic holder for thin specimens which must be polished on both sides.

11-203. Adherence of Enamel. Allen C. Francisco. *Metal Progress,* v. 52, Nov. 1947, p. 812.

Instrument developed at Bureau of Standards for testing adherence of enamel.

11-204. The Heat and Mass Flow Analyzer—A Tool for Heat Research. Victor Paschkis. *Metal Progress,* v. 52, Nov. 1947, p. 813-818.

Principles of a mathematical analyzer developed at Columbia University. Miscellaneous metallurgical problems including furnace construction, operation of controls, solidification of ingots and castings, and heating of masses of metal. Results in several cases have been satisfactorily verified both by direct experiment and by calculation. 35 ref.

11-205. Mathematical Analyses of Metallurgical Data. Michael G. Corson. *Metal Progress,* v. 52, Nov. 1947, p. 828-829.

Claims to present a more logical approach to the systematic evaluation of cooling time of Jominy bars to half-temperature than that presented by Liedholm in the Feb. issue.

11-206. Width of Crack Discoverable by Deep Etching. Russell H. Lauderdale. *Metal Progress,* v. 52, Nov. 1947, p. 830-831.

Two hardened toolsteel blocks were wrung and bolted together. Then several metallographic procedures were applied in order to reveal the crack between the two pieces. The usual technique (50% HCl at 170° F. for 45 min. plus 10 sec. in 10% Nital) showed no crack. Neither did wet magnafluxing. Macroetching in hot HCl revealed the joint.

11-207. Porcelain Enamel Adherence Tester. *Technical News Bulletin (National Bureau of Standards),* v. 31, Nov. 1947, p. 130-131.

A new instrument based on completion of an electric circuit through the metal of the deformed specimen to a steel probe touching the test area. By using a large number of probes, and counting the number that conduct a current during the test, an estimate can be obtained of the area that has been exposed.

11-208. A Modified Fitch Thermal Conductivity Apparatus. Zaboj V. Harvalik. *Review of Scientific Instruments,* v. 18, Nov. 1947, p. 815-817.

An apparatus based upon increase of temperature of a receiver by heat transferred through the sample and its modification to samples inclined to the horizontal. Temperature changes of the receiver are measured with thermocouples.

11-209. Divergent Beam X-Ray Photography of Metallic Single Crystals. A. H. Geisler, J. K. Hill, and J. B. Newkirk. *Physical Review,* v. 72, Nov. 15, 1947, p. 983-984.

A new type of X-ray diffraction phenomenon observed in Laue patterns of certain alloys is similar to the Kikuchi lines which are found in electron-diffraction patterns of thick crystals. Such patterns can be used for determinations of crystal orientation and precise lattice constants and for an evaluation of the perfection of the crystal.

11-210. Testing by Ultrasonics. S. Young White. *Audio Engineering,* v. 31, Nov. 1947, p. 28-30, 39-40.

Three fundamental test methods are by reflection, by velocity, and by attenuation of the signal. How ultrasonics may be used to detect flaws in metals, measure temperatures of molten metal or glass, and to mix accurately gases and liquids in process controls.

11-211. Deoxidation Control by Fractography. G. C. Woodside. *Iron Age,* v. 160, Dec. 4, 1947, p. 78-79.

By fracturing brittle materials and examining an unpolished grain surface which lies at right angles to the objective, it is possible to observe more clearly any constituent, such as oxide or carbide, which may be present at the grain boundaries. This fractographic technique is used in the Climax Molybdenum laboratory in controlling deoxidation of arc melted and cast molybdenum ingots.

11-212. The Determination of Tin Coating Weights on Tin-Plate. Hugh A. McKenzie. *Journal of the Society of Chemical Industry,* v. 66, Sept. 1947, p. 312-319.

Methods for estimating weights by removing the tin coating quantitatively. The action of several stripping reagents on both hot-dipped and electrolytic tin-plates was studied by measuring weight losses and by metallographic examinations of the stripped specimens. Hydrochloric acid inhibited with antimony trichloride was the only reagent which completely removed the tin coating and the alloy layer from hot-dipped plates. Alkaline potassium iodate is a satisfactory alternative reagent for electrolytic plates. 30 ref.

11-213. The Automatic Control of the Spectrographic Exposure. C. H. R. Gentry, D. Newson, and D. F. Rushman. *Journal of the Society of Chemical Industry,* v. 66, Sept. 1947, p. 323-325.

An electronic circuit by which the necessary cycle of operations is automatically produced. By choosing suitable values of the components, a multiposition selectro switch enables a choice of pre-spark and exposure times to be made.

11-214. New Applications of X-Ray and Electron Beams to Metal Research. Ben H. Alexander. *Metal Progress,* v. 52, Dec. 1947, p. 989-990, 1024.

Reviews series of papers presented at Fifth Annual Conference on X-Ray and Electron Diffraction, Pittsburgh, Nov. 7-8, 1947.

11-215. The Measurement of the Magnetic Properties of Fine Wire. P. T. Hobson, E. S. Chatt, and W. P. Osmond. *Electronic Engineering,* v. 19, Dec. 1947, p. 383-388.

Apparatus for measurement of the remanence and coercivity of fine wires of diameter 0.004 in. with a maximum applied field of 1000 oersteds, and with maximum sensitivity to allow readings of remanence to be made as low as 100 gausses. Appendix on application of differential permeability curves to the magnetic analysis of alloys.

11-216. Instruments and Their Applications as Reported in Recent Literature. Orval L. Linebrink. *Metals Review,* v. 20, Dec. 1947, p. 5-7, 9.

Reviews the literature of 1946 and 1947 to date on the above subject with references to items in *Metals Review's* "Review of Current Metal Literature".

11-217. Instrumentation. *Metals Review,* v. 20, Dec. 1947, p. 11, 13, 15, 17, 19, 21.

Miscellaneous new equipment for metallurgical process control, with some notes on modern laboratory devices, as described by the manufacturers.

11-218. Microradiography. F. W. Von Batchelder and J. H. Schaum. *Iron Age,* v. 160, Dec. 11, 1947, p. 94-97.

Method of producing microradiographs. Microradiographs and photomicrographs of identical structures illustrate the basic differences between the two procedures.

11-219. Une Methode Rapide de Préparation des Cristaux Uniques Metalliques. (A Rapid Method for Preparation of Single Metallic Crystals.) Paul Lacombe and Louis Beaujard. *Revue de Metallurgie,* v. 44, March-April 1947, p. 65-70.

The new method of producing single crystals by solidification from molten metal was compared with the old method of recrystallization from the solid state. Various methods of solidification are compared. 99.99% pure aluminum was used in the laboratory tests.

11-220. X-Ray Investigation by Means of "Photo-Electrons". A. K. Trapeznikov. *Factory Laboratory (U.S.S.R.),* v. 13, Aug. 1947, p. 945-949. (In Russian.)

It was found that very thin objects, too transparent for direct X-ray investigation, may be studied by means of secondary beta rays induced by the primary beam. By reverse beta radiation it is possible to detect fractures and cracks in coatings and to determine the homogeneity of the surfaces of solid substances. The latter requires the presence of components having greatly differing atomic numbers.

11-221. New GIFTI Photo-Colorimeter. P. A. Ivanov and Z. E. Sukhareva. *Factory Laboratory (U.S.S.R.),* v. 13, Aug. 1947, p. 964-969. (In Russian.)

A new instrument developed by the Gorki Physical-Technical Research Institute. Circuits and selenium photocell used.

11-222. A Gage for Measuring Compression Force. P. H. Rinkel. *Journal of Scientific Instruments,* v. 24, Nov. 1947, p. 298-299.

A test body is placed, together with the gage, in a press or vise and subjected to compressing force. The amount of force is shown on the gage during the test, and can be adjusted or varied as desired.

11-223. A Furnace for High-Temperature X-Ray Powder Cameras. T. C. Alcock, H. S. Peiser, J. S. Pont, and H. T. S. Swallow. *Journal of Scientific Instruments,* v. 24, Nov. 1947, p. 297-298.

A small radiation furnace for use in a high-temperature, vacuum, X-ray camera of the Owen type. Chief features are uniformity of temperature and small surface area which render the furnace suitable for high-vacuum work.

11-224. Electrochemical Jet Method for Local Thickness of Electrodeposits on Metals. A. Ogarev. *Electroplating,* v. 1, Dec. 1947, p. 54-60. (Translated from *Journal of Applied Chemistry (U.S.S.R.),* v. 19, no. 3, 1946, p. 311-315.)

Modified method for determination of thickness of deposits of Cr, Ni, Cu, Sn, Zn, or Cd on another metal by anodic solution. Advantages claimed are the use of a universal electrolyte of simple composition which can be used for 50 to 70 determinations, indication of end point by change in current density, and freedom from temperature effects.

11-225. Detection of As-Cast Austenite Grain Size in Heat Treated Cast Alloy Steels. Edward A. Loria. *Transactions of American Society for Metals,* v. 40, 1948, p. 677-691; discussion, p. 691-702.

See item 11-130.

11-226. Multiple Correlation Applied to Steel Plant Problems. W. T. Rogers. *Transactions of American Society for Metals,* v. 40, 1948, p. 935-950; discussion, p. 950-953.

See item 11-129.

11-227. Metallography of Hot-Dipped Galvanized Coatings. D. H. Rowland. *Transactions of American Society for Metals,* v. 40, 1948, p. 983-1005; discussion, p. 1005-1011.

See item 11-128.

11-228. Electron Metallographic Methods and Some Results for Magnesium Alloys. R. D. Heidenreich, C. H. Gerculd, and R. E. McNulty. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division)*, 1946, p. 15-36.

Previously annotated from *Metals Technology*, April 1946, T.P. 1979 in R.M.L., v. 3, 1946.

11-229. "Shadow-Cast" Replicas for Use in the Electron Microscope. Helmut Thielsch. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division)*, 1946, p. 37-46; discussion, p. 46-47.

Previously appeared in *Metals Technology*, Feb. 1946, T.P. 1977. 54 ref.

11-230. Graphical Methods of Representing Some Conditions of Plasticity. William Marsh Baldwin, Jr. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division)*, 1946, p. 55-65; discussion, p. 65-67.

Previously annotated from *Metals Technology*, April 1946, T.P. 1980 in R.M.L., v. 3, 1946.

11-231. An Apparatus for the Determination of the Viscosity of Welding Slags. P. K. Gledhill. *Symposium on Metallurgy of Steel Welding (British Welding Research Assoc.)*, 1947, p. 88-93; discussion, p. 93-94.

Earlier work has been carried out mainly on glasses and slags that could be melted in graphite or platinum crucibles. The relatively high contents of iron and manganese oxides present in welding slags, however, prohibit the use of such crucibles. Mild-steel crucibles, as suggested by two Russian workers (Zvyerolf and Kaufmann), were investigated and found to be satisfactory for temperatures up to 1400° C.

11-232. The Electron Microscope and Its Application to Metals. Charles S. Barrett. *Electronic Methods of Inspection of Metals (American Society for Metals)*, 1947, p. 107-150.

Operating characteristics, applications, results which can be obtained, and how the results compare with those obtained on standard optical instruments in quality, in usefulness, and in the effort required to get the results. 28 ref.

11-233. Electronics in Liquid Steel. Harold T. Clark. *Electronic Methods of Inspection of Metals (American Society for Metals)*, 1947, p. 151-183.

Electronic instruments developed and applied to control of steel melting and refining and to rapid analysis. Openhearth flame-radiation measurements, openhearth bath pyrometers, magnetic methods for carbon in steel and bessemer flame control. 26 ref.

11-234. Report of Committee E-4 on Metallography. *American Society for Testing Materials Proceedings*, v. 46, 1946, p. 486-488.

Recommendations for changes in methods. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

11-235. A Permeameter for Metals Used in Cathode-Ray and Television Tubes. Howard J. Evans. *American Society for Testing Materials Proceedings*, v. 46, 1946, p. 1119-1125.

The construction and calibration of an inexpensive permeameter for rapid routine measurements of paramagnetic alloys of low permeability. This instrument can be used to measure the permeability of metal samples in the form of wire, strip, rod, tubing, or any sample whose cross section is constant throughout its length. Application was made to measurement of the permeability of six alloys which have been used in cathode-ray and television tubes. The permeability of each alloy when fully annealed was found to be a constant independent of the magnetizing field used. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

11-236. Design and Application of Accelerometers. David E. Weiss. *Proceedings of the Society for Experimental Stress Analysis*, v. 4, no. 2, 1947, p. 89-99; discussion, p. 100-102.

The theory and application of spring-mass systems used to measure accelerations. Graphical data on the motion of such systems are presented as an aid in interpreting accelerometer records and in determining the applicability of an accelerometer to a particular problem. Such systems are useful in the dynamic testing of aircraft structures, for recording simultaneously such quantities as strains, loads, velocities, and control-surface deflections, in addition to linear and angular accelerations.

11-237. "Photo Position Finding" — a Time-Saving, Money-Saving Method of Communication. A. C. Kalk. *Transactions of the American Foundrymen's Association*, v. 53, 1946, p. 163-167.

Method for accurate description and transmission of casting discrepancy information.

11-238. Microscope and Camera in the Study of Foundry Sand. A. C. Den Breejen. *Transactions of the American Foundrymen's Association*, v. 53, 1946, p. 222-228.

Previously annotated in R.M.L., v. 3, 1946.

SECTION XII

INSPECTION AND STANDARDIZATION

12-1. Sensible Standardizations With Statistical Quality Control. Clifford W. Kennedy. *Production Engineering & Management,* v. 18, Dec. 1946, p. 75-78, 80.

Practical approach to a statistical system which will reduce salvage, lessen scrap loss and increase usable product output by controlling dimensional quality directly at the machine tool.

12-2. Modern Laboratory Geared to Production. *Steel,* v. 119, Dec. 30, 1946, p. 64-66, 110.

Providing facilities for carrying on routine and special chemical and physical tests on materials going into automotive parts, the new metallurgical laboratory at White Motor Co. is an excellent example of how modern planning can save steps and speed production by efficient processing of test samples. Department is equipped to check all bar stock, forgings and castings used in White trucks, and to supplement the inspection work of test stations located throughout the Cleveland factory. Examines service failures and recommends redesign or change of material; carries on experimental heat treating, X-rays castings, conducts metallographic examinations and makes routine checks on lubricants.

12-3. One in Ten an Inspector. *Steel,* v. 119, Dec. 30, 1946, p. 70-72.

At Monroe Auto Equipment Co. inspection is supervised by the men who design the products and the men who design the tools on which the products are made. Inspection department, including engineers and tool designers, report directly to the management of the company. Revamped inspection setup makes possible the production of higher quality parts than those manufactured in the smaller prewar output.

12-4. Inspection and Packing of Sewing Needles. *Machinery (London),* v. 69, Nov. 28, 1946, p. 683-687.

Touch inspection; sticking in cloth strips; "furnishing" in paper wrapper; loose wrapping.

12-5. How to Use Statistical Methods in Quality Control. Robert J. Davis. *Chemical Engineering,* v. 53, Dec. 1946 p. 115-117.

Applications of the method; acceptance control; finished product control; illustrated with tables and charts.

12-6. Shop Manual on Gage Usage Helps Inspector and Operator. William P. Wehlau and D. Thorburn. *American Machinist,* v. 91, Jan. 2, 1947, p. 79-81.

Recommends procedures for using various types of gages. Pointers for inspectors and operators.

12-7. Economic Aspects of Standardization. John F. Cramer. *Fasteners,* v. 3, no. 5, 1946, p. 6-9.

Comparative costs of bolts used on B-29 planes indicates a saving of about $400 per plane due to use of standardized internal wrenching bolts.

12-8. Quality Control of Automotive Valve Line Production. E. F. Gibian. *Tool & Die Journal,* v. 12, Dec. 1946, p. 76-84.

Application of statistical control procedures to line production illustrated by example dealing with the manufacture of automotive valves. Formulation of a quality control program; preliminary findings; statistical control of individual operations; conditions prior to the installation of statistical process control; rules for statistical control in line production.

12-9. Betatron—a New Inspection Tool for Industrial Applications. *Electrical Manufacturing,* v. 39, Jan. 1947, p. 126-128, 130.

The commercial Betatron developed by Allis-Chalmers and its applications

12-10. Statistical Quality Control in Its Application to Specification Requirements. *American Society for Testing Materials Symposium,* Nov. 1946, 15 p.

Introductory remarks, two papers, and discussion. Goffman and Manuele

give details of the use of statistics in writing specifications. Colonel Simon tells how intelligent use of specifications at Aberdeen Proving Ground cut inspection costs and resulted in improved products.

12-11. Inspecting Turbosupercharger Blades by Optical Projection Comparator. E. C. Polidor. *Iron Age,* v. 159, Jan. 16, 1947, p. 40-44.

How this can now be done rapidly and accurately by the use of a newly developed instrument known as the Pant-O-Jector. Using a beam of light to trace the profile on a special comparator chart not only indicates the form of the blade but also locates it in relation to the center of gravity.

12-12. Engineering and Quality Control. P L. Alger. *Electrical Engineering,* v. 66, Jan. 1947, p. 16-19.

Laws of chance, sampling theory and quality control procedures. Interpretation of control charts illustrated by samples showing variations in Brinell hardness.

12-13. Quality Control Handbook. Eugene Goddess. *Steel,* v. 120, Jan. 20, 1947, p. 70-73.

Step-by-step procedures in which a quality control program is established that provides a permanent record. This will furnish information regarding the state of control at each machine and thus improve production.

12-14. Popular Types of Steels. G. D. Boyer. *Product Engineering,* v. 18, Jan. 1947, p. 81-85.

Current trends toward standardization in the specification of bar stock steels for use in the manufacture of industrial products. Desirability of standardizing on the most popular steels to minimize procurement difficulties. Machinability characteristics of the various steels.

12-15. The Betatron. W. Bosley. *Journal of Scientific Instruments,* v. 23, Dec. 1946, p. 277-283.

Theory, development, and applications. Diagrams and photographs.

12-16. The Active Portion of Involute on External Spur and Helical Gears. Sidney Cornell. *Machinery,* v. 53, Jan. 1947, p. 150-154.

Knowing the active portion of involute gear teeth permits the use of profile recording machines with greater accuracy and with less danger of damage to the instrument. Method of determining the used portion of the involute developed and applied to its measurement.

12-17. Inspecting and Measuring Jet-Propulsion Blades. *Machinery,* v. 53, Jan. 1947, p. 185-188.

Standard comparator, such as is employed for the inspection of precision screw-thread profiles, is equipped to provide an accurate and rapid method of inspecting jet-propulsion and turbine blades. "Pant-O-Jector" equipment combines the operating principles of a pantograph and an optical projector. Blade to be inspected is gripped by its root in the workholding fixture, which can be adjusted to hold the blade surface to be checked in the required position.

12-18. Precision Method of Checking Compound Angles. James Ahearn. *Machinery,* v. 53, Jan. 1947, p. 178-181.

Meets the needs of precise checking, and at the same time provides a quick setup for repetitive inspection.

12-19. A Statistical Survey of Some Hardened Steel Forgings. Roger F. Mather. *Metal Progress,* v. 51, Jan. 1947, p 79-85.

During three years of production of the Willys "Jeep" and its trailer, statistical surveys of the physical properties of heat treated steel parts were made. Shows how writing of specifications for tensile properties may be improved by using results of such a study.

12-20. Radiography of Spot Welds in Various Sheet Gages and Dissimilar Gage Combinations. R. C. McMaster, F. C. Lindvall and L. P. Gaard. *Welding Journal,* v. 26, Jan. 1947, p. 19-29.

Experimental results of work done on 24S-T alclad aluminum alloy sheets.

12-21. The Detection of Cracks in Steel by Means of Supersonic Waves. C. H. Desch, D. O. Sproule, and W. J. Dawson. *Welding Journal,* v. 26, Jan. 1947, p. 1s-25s.

Previous methods; theoretical considerations; apparatus and techniques; and a few typical results. This is practically a manual on the subject. Extensively illustrated.

12-22. Important New Actions on Standards. *ASTM Bulletin,* Dec. 1946, p. 8-10.

Nature of the new and revised standards for nonferrous metals, clay tile, electrical insulating materials, welding electrodes, aluminum and magnesium, and petroleum tests.

12-23. Material Purchase Specifications. S. B. Ashkinazy. *ASTM Bulletin,* Dec. 1946, p. 48-51.

Composition-type specification; properties-type specification; and performance-type specification. 27 ref.

12-24. Report of Activities of A.I.S.E. Standardization Committee, 1946. *Iron and Steel Engineer,* v. 24, Jan. 1947, p. 98-109.

Report includes introduction and separate reports on design of ladle hooks and hot metal ladles; chains and slings; shunting for motor brushes; surface finish designation;

dirt in steel mill atmospheres; turbine inspection; inspection practices for maintenance of mill buildings; fuel, furnace, ceramics, and control engineers' handbook; handbook of lubrication standards for the steel industry; plain bearings; safety switches; flexible and solid couplings; wiring diagram and control schemes.

12-25. Multiple Air Gaging Operations. W Fay Aller. *American Machinist*, v. 91, Jan. 30, 1947, p. 101-103.

Applications of several gaging heads developed for internal and external measurements.

12-26. Sheet Steel. Nomenclature in the Measurement of Thickness—Conversion Formulas. J. H. Mort. *Iron and Steel*, v. 20, Jan. 1947, p. 9-11.

Bases on which the various gage tables are founded and conversion formulas showing the connections between them.

12-27. Machinability. Ernest J. Baty. *Iron and Steel*, v. 20, Jan. 1947, p. 23-25.

An induction test for the rapid sorting of machinable from unmachinable bars.

12-28. Report of Committee 15—Iron and Steel Structures. *American Railway Engineering Association Bulletin*, v. 48, Jan. 1947, p. 389-395.

Includes revisions of specifications for steel railway bridges and other parts; specifications for fusion welding and gas cutting for steel structures, collaborating with A.S.T.M. Committee A-1 on steel, and the American Welding Society Conference on bridges.

12-29. Checking Concentricity of Round Parts. *Steel*, v. 120, Feb. 3, 1947, p. 127.

By automatically determining the proper center-line heights for any combination of diameters involved in a workpiece, the V-liner shown eliminates use of complicated measuring equipment and mathematical computations in checking relative concentricities on round parts or sections.

12-30. Inspection of Railroad Car Parts. C. B. Bryant. *Railway Mechanical Engineer*, v. 121, Feb. 1947, p. 73-74; discussion, p. 74-77.

Partial report of Conference on Magnaflux Inspection held in Chicago early in 1946.

12-31. Testing With Magnaflux on the D. & R.G.W. Ray McBrian. *Railway Engineering and Maintenance*, v. 43, Feb. 1947, p. 137-139.

Practices and experience of the Denver & Rio Grande Western in testing of various components of the track structure, track tools and other items used by maintenance of way and other departments.

12-32. Quality Control Aids Supervisors. Part I. David T. Armstrong. *American Machinist*, v. 91, Feb. 13, 1947, p. 101-105.

Basic principles of quality control and shows the shop man how to interpret control chart.

12-33. Recommended Practices for Dimensioning and Tolerancing. Merhyle F. Spotts. *Product Engineering*, v. 18, Feb. 1947, p. 88-91.

Dimensioning of cylindrical fits; dimensioning of tapers; positional tolerances; inspection by fixed position gages.

12-34. The Use of Instruments for Controlling Quality. Joseph Manuele. *Machinery*, v. 53, Feb. 1947, p. 156-159.

A quality control program based on a gaging method that shows the divergence of parts from specifications resulting in less scrap loss, and consequently in lower production costs.

12-35. Rail Failure Statistics. *American Railway Engineering Association Bulletin*, v. 48, Feb 1947, p. 673-689.

Progress report presents rail failure data reported through Dec. 31, 1945.

12-36. Investigate Joint Bar Failures and Give Consideration to the Revision of Design and Specification. *American Railway Engineering Association Bulletin*, v 48, Feb. 1947, p. 714-729.

Work conducted at University of Illinois during 1946.

12-37. Corrugated Rail—Causes and Remedy. *American Railway Engineering Association Bulletin*, v. 48, Feb. 1947, p. 729-733.

Includes second progress report on corrugated rails by R. E. Cramer. A typical "corrugated" rail was examined in the laboratory, and a technique was devised to study the effect of wheel slippage in producing hard spots on rails.

12-38. Development and Characteristics of Fractures Under Engine Burns in Rail, Together With Investigations as to the Effectiveness of Welding-Up Engine Burns by Oxy-Acetylene or Electric Methods. *American Railway Engineering Association Bulletin*, v. 48, Feb. 1947, p. 734-750.

Committee-progress report on rolling-load tests on burned rails, and a report on the preparation, testing, and results of examination of rails damaged by spinning locomotive driving rolls. This causes visible effects called "driver burns," which cause extreme hardness because of development of martensite structure.

12-39. Investigate Causes of Shelly Spots and Head Checks in Rail Surfaces for the Purpose of Developing Measures for Their Prevention. *American Railway Engineering Association Bulletin*, v. 48, Feb. 1947, p. 750-766.

Committee report includes a summary of service inspection data; results of a field investigation by A.R.

E.A.'s research staff on applied vertical wheel loads and position of centroid of wheel bearings calculated from measured vertical web stresses on a 6° curve of N. & W. Railway, in an attempt to account for shelling in the outer rail of the westbound track; fifth progress report of studies at University of Illinois on results of laboratory rolling-load tests and preliminary report of Battelle Memorial Institute's study of shelled rails.

12-40. Investigate Recent Developments Affecting Rail Design. *American Railway Engineering Association Bulletin*, v. 48, Feb. 1947, p. 767-808.

Committee report includes results of analysis made by the research staff of the A.R.E.A. of the stress measurements made on the N. & W. in 1945; a summary of tests made by the research staff of the A.R.E.A. on 90-lb. A.S.C.E. and 112-lb. R.E. rail in 18° curves on the D., T. & I. Railroad; and progress report on a study of the fatigue strength of rail web steel, conducted at the University of Illinois.

12-41. Thirteenth Progress Report of the Cooperative Investigation of Failures of Railroad Rails in Service and Their Prevention. R. E. Cramer. *American Railway Engineering Association Bulletin*, v. 48, Feb. 1947, p. 809-818.

Examination of control cooled and Brunorized rails which failed in service.

12-42. Inspecting Metals With Supersonics. H. Nicholson and L. Rotherham. *Steel*, v. 120, Feb. 24, 1947, p. 72-75, 114, 116, 118, 120.

Results of applying this testing method in works practice to larger masses, billets, plates, castings and welds. Conditions necessary for practical testing.

12-43. Precision Measurement. Section II. Instrument Inspection (Cont.). Part VIII. Inspection of Height Gage and Solid Square. Warren Baker. *Machine and Tool Blue Book*, v. 43, Feb. 1947, p. 241-248, 250-252, 254.

The inspection of scaled-type and transfer-type height gages. Tests for flatness. The method used to determine perpendicularity of height gages.

12-44. Carbon and Alloy Steels for General Service Applications. *Metallurgia*, v 35, Jan. 1947, p. 130-132.

Schedule B.S./S.T.A.5, revised and issued for the Ministry of Supply as a permanent document for common use at all stages from development to production. Attention is directed to additions of detail, to additional steels included, and to the amplification of notes on their selection.

12-45. How to Get Good Detail in X-Ray Negatives. *American Machinist*, v. 91, Feb. 27, 1947, p. 81-84.

Hidden defects in workpieces are revealed in proper detail if certain basic factors are understood and used in making radiographic examinations. Interpretation of radiograms.

12-46. Quality Control Aids Supervisors. Part II. David T. Armstrong. *American Machinist*, v. 91, Feb. 27, 1947, p. 96-100.

Quality control data plotted in graph form and provided with upper and lower control limits show effect of process control.

12-47. Standard List of Seamless Mechanical Tubing. *American Machinist*, v. 91, Feb. 27, 1947, p. 123.

Tabulated list of sizes for warehouse stocks of round seamless cold finished mechanical tubing made of carbon steel with 0.25% carbon.

12-48. The Classification and Recording of Spot Weld Defects Revealed by Radiography. R. C. McMaster, F. C. Lindvall and Edythe Dial. *Welding Journal*, v. 26, Feb. 1947, p. 121-128.

A possible method of classifying the presence and extent of spot weld defects revealed by radiography by which observations from spot weld radiographs could be recorded and transmitted from one individual to another. Punch card system for filing radiographic data.

12-49. Taper Production, Gaging and Gages. W. Richards. *Machinery (London)*, v. 70, Jan. 16, 1947, p. 67-72.

Construction and application of the Universal taper-measuring gage.

12-50. Radiography of Captured Enemy Equipment by the U. S. Navy. Donald T. O'Connor. *Industrial Radiography & Non-Destructive Testing*, v. 5, Winter 1946-1947, p. 6-10.

Radiographic instruments and their application at the Ordnance Investigation Laboratory at Indian Head, Md.

12-51. Radon Leakage From Navy Radium Capsules. Herman F. Kaiser. *Industrial Radiography & Non-Destructive Testing*, v. 5, Winter 1946-1947, p. 11-17.

A series of field and laboratory tests to determine the extent of radon leakage in radium capsules. Majority of the capsules tested showed leakage to a greater or less extent. Tests were carried out to determine best means of sealing leaking capsules in steel cartridges. These showed that this may best be done by solder sealing the steel cartridges. The internal cavity of the cartridge must be kept to a minimum to avoid loss of radiographic definition.

12-52. Fluoroscopic Examination of Metallic Objects. B. Cassen and D. S. Clark. *Industrial Radiography & Non-Destructive Testing*, v. 5, Winter 1946-1947, p. 34-37.

An investigation undertaken at

California Institute of Technology to determine the limitations and the reliability of fluoroscopic methods of examination of metallic materials; comparison with radiographic methods; as a supplement to or replacement for radiography of metallic materials; and to extend the field of usefulness of fluoroscopy by improvement in equipment and technique.

12-53. An Integrating Photometer to Measure Porosity in Castings. Edward I. Salkovitz. *Industrial Radiography & Non-Destructive Testing,* v. 5, Winter 1946-1947, p. 38-40.

An integrating photometer could be used to measure directly the degree of porosity indicated in a radiograph. Theory, construction, calibration, operation, and alternative construction.

12-54. Inspection Efficiency and Sampling Inspection Plans. Marvin Lavin. *Journal of the American Statistical Association,* v. 41, Dec. 1946, p. 432-438.

Published sampling inspection plans contain the assumption that inspection is completely efficient, that is, that the items examined are invariably classified correctly. Some contributing factors to lack of inspection efficiency are noted, and an analysis of the validity of the guarantees of the plans in the presence of inspection error.

12-55. The Marginal Zones of the Plates for Locomotive Boilers. M. P. Jourmat. *Engineers' Digest (American Edition),* v. 4, Feb. 1947, p. 91.

Specifications governing acceptance of boiler plates by French National Railways. Non-normalized plates are permitted, provided they pass certain tests. There is danger of recrystallization of the marginal zones to coarse grains, during boiler construction or service. This will take place in the hot zones when plates of fine grain structure are used. Recommends addition of micrographic test to present test procedures, or better, prohibition of use of non-normalized plates. (Condensed from *Revue Générale des Chemins de Fer,* France, v. 65, Nov. 1946, p. 195-197.)

12-56. Precision Measurement. Section II. Part IX. Warren Baker. *Machine and Tool Blue Book,* v. 43, March 1947, p 190, 192, 197, 199-202, 204.

Inspection of the cylindrical, square, flats, straight edges and parallels. Methods of procedure and the tools necessary to perform accurate inspection jobs

12-57. Starts Standardization of Stainless Pipe & Fittings. *Heating, Piping & Air Conditioning,* v. 19, March 1947, p. 89-90.

Recent report of Standardization Committee of the Heating, Piping and Air Conditioning Contractors National Association.

12-58. Statistical Engineering. Robert C. Tumbleson. *Federal Science Progress,* v 1, April 1947, p. 37-40.

Newer techniques in tolerance specifications, quality control, acceptance sampling, and performance studies. Quality control charts of Brinell hardness, and graphs showing relationships between Brinell hardness, yield point, and tensile strength.

12-59. Magnetic Particle Inspection of Chromium-Plated Tools. M. H. Mueller and W. E. Yeast. *Metal Progress,* v. 51, March 1947, p. 420-425.

How change in the equipment and technique of magnetic inspection, together with draws at 350° F. to relieve internal stresses, brought rejects down from around 50 to 0.5% in an epidemic of broken tools used in the manufacture of small arms ammunition.

12-60. Selecting Steels by Hardenability Bands. Charles M. Parker. *Materials & Methods,* v. 25, March 1947, p. 68-72.

Development of a method of selection on the basis of hardenability to overcome faults inherent in specifying steels according to chemical composition.

12-61. Installing a Quality Control Program. Norbert L. Enrick. *Materials & Methods,* v. 25, March 1947, p. 90-93.

Principles behind the establishment and operation of a quality control program that can be a useful guide in any metalworking plant. Master sampling tables show keystones around which quality control programs are built.

12-62. Radiography and the Fatigue Strength of Spot Welds in Aluminum Alloys. R. C. McMaster and H. J. Grover. *Welding Journal,* v. 26, March 1947, p. 223-232.

A large number of spot weld specimens, in which significant variables were controlled and specific welding conditions were varied, were provided to Battelle Memorial Institute by several West Coast aircraft manufacturers for the research described. 137 of these specimens were radiographed, then subjected to fatigue tests. Tentative conclusions concerning effects of different factors are given and further research is recommended.

12-63. Quality Control Aids Supervisors. Part IV. David T. Armstrong. *American Machinist,* v. 91, March 27, 1947, p. 104-107.

Meaning of standard deviation; calculations; charts for variables.

12-64. Supersonic Flaw Detection Is Nondestructive. R. S. Davidson. *Industry and Power,* v. 52, April 1947, p. 79-81, 118.

Method similar to echo sounding from ships utilizes frequencies of approximately 750 kilocycles for locating flaws in nonmetals, as well as metals. Work at higher frequencies is believed to be applicable to investigation of internal structures of materials.

12-65. **Supersonic Waves Locate Die-Block Flaws.** R. W. Snowdon. *Steel,* v. 120, April 7, 1947, p. 95, 136-137.

Portable reflectoscope employs supersonic or ultrasonic waves which are transmitted into the material to be tested through quartz crystal. Contact is effected through light insulation oil applied to the surface of the piece.

12-66. **Uma Classificacao e Descricao dos Acos-Niquel. (A Classification and Description of Nickel Steels.)** Horacio Allyn Hunnicutt. *Boletim de Associacao Brasileira de Metais,* v. 3, Jan. 1947, p. 95-116.

A classification of nickel steels is proposed; a brief description of each type. Influence of nickel content on properties. (The article is based on English work, although not a direct translation.)

12-67. **Thread Position Gages.** *Machinery (London),* v. 70, March 6, 1947, p 225-231.

Design and production of a gage used for the Bren light machine gun.

12-68. **Recording Magnetic Detector Locates Flaws in Ferrous Metals.** C. H. Hastings. *Product Engineering,* v. 18, April 1947, p. 110-112.

Device, which operates on the principle of measuring the magnetic leakage caused by the presence of flaws in magnetized steel or other ferromagnetic materials, provides a dependable method of nonvisual flaw detection of cracks and other flaws on or near the interior surfaces of hollow parts such as cylinders and gun tubes.

12-69. **The Use of Air Gages in Quality Control.** Frank W. Blanchette. *Machine and Tool Blue Book,* v. 43, April 1947, p. 214-216, 218, 220, 222-226.

Application, measurement at the machine, and some sampling methods.

12-70. **The Value of Highly Destructive Testing.** Michael G. Corson. *Metal Progress,* v. 51, April 1947, p. 613-616.

Destructive tests on forged parts for variable-pitch propellers—parts rejected because of slight surface or sub-surface discontinuities—indicate that the body of the metal nearly always has considerably better tensile properties than specified, and the over-all strength of the part is far greater than the maximum requirements.

12-71. **Gun Metal Castings, Radiographic Tests.** William H. Baer. *American Foundryman,* v. 11, April 1947, p. 111-116.

Identifies various typical defects in gun metal by means of radiographs. More than 100 gun metal plates 8x6x1 in. of nominal composition 88% copper, 8% tin, and 4% zinc, were cast under carefully controlled conditions so as to produce the defects. Complete records of melting and molding practice were kept to facilitate the reproduction of the defects when required. Defects included distributed shrinkage, hot tears, sand and slag inclusions, and gas porosity. Investigation was confined to the correlation of defects with foundry practice.

12-72. **Magnetic Particle Inspection, Castings Industry Applications.** W. E. Thomas. *American Foundryman,* v. 11, April 1947, p. 104-110.

Foundry uses for magnetic particle inspection: as an aid in developing molding and pouring technique; as an aid in developing cleaning and foundry processing practices; as an aid in production control; as an aid in the repair of defects; and as an aid in the final inspection for defects.

12-73. **The Practical Aspect of Modern Quality Control Methods.** Clifford W. Kennedy. *Iron Age,* v. 159, April 10, 1947, p. 66-69.

A practical down-to-earth appraisal of quality control methods, what quality control is, how it affects costs and how it can be put to work for management without the necessity of elaborate preparation.

12-74. **Much Activity in Standardization and Research Shown at the 250 Sessions Held During A.S.T.M. Committee Week.** *ASTM Bulletin,* March 1947, p. 30-41.

Work of the various standards committees.

12-75. **Taper Production, Gaging and Gages.** W. Richards. *Machinery (London),* v. 70, March 27, 1947, p. 309-312.

Procedures for measuring and inspection of gage blocks for taper parts.

12-76. **The X-Ray Storage Properties of the Infrared Storage Phosphor and Application to Radiography.** O. E. Berg and H. F. Kaiser. *Journal of Applied Physics,* v. 18, April 1947, p. 343-347.

An application whereby the expense and trouble of X-ray film processing may be partially or completely eliminated. One feature of this method is the complete removal of harmful X-radiation. The possibility of a new field of radiography in "flash fluoroscopy" is also suggested. Graphs and charts exhibit the characteristic behavior of infrared phosphors to X-ray energy and photographs and radiographs compare radiography with phosphorography.

12-77. Constructing a Multiple Exposure Chart for X-Rays. *Steel,* v. 120, April 28, 1947, p. 103-104, 134.

Method for preparing a sliding scale exposure chart for X-ray and gamma-ray exposures so that data available on several existing charts can be incorporated in one chart for convenient use.

12-78. Controlling a Heat of Steel. Ralph G. Paul. *Western Machinery and Steel World,* v. 38, April 1947, p. 78-81, 108-109, 116.

Quality-control methods in Columbia Steel Co.'s Pittsburg Works, where nearly 400,000 tons of steel a year are made by the basic openhearth process. Methods incorporate the most modern techniques.

12-79. Utilization of Supersonics for the Testing of Materials. H. Bömmel and R. V. Baud. *Engineers' Digest (American Edition),* v. 4, April 1947, p. 176-177.

Fundamental principles of the use of ultrasonic waves for nondestructive testing of materials. Illustrated by several examples. (Condensed from *Zeitschrift fur Schweisstechnik,* v. 36, no. 9, Sept. 1946, p. 185-187; no. 10, Oct. 1946, p. 207-209.)

12-80. Surface Defects in Steel Bars for Bolt Manufacture and Wiredrawing. R. Hoffmann. *Engineers' Digest (American Edition),* v. 4, April 1947, p. 194.

Invisible defects due to unsatisfactory founding or rolling control. Five different types of defects—scratches, cracks, laminations, fissures, and small flaws—analyzed by inspection, and mechanical and chemical tests. (Abstracted for *Revue Universelle des Mines, de la Metallurgie, des Travaux Publics,* Belgium, v. 2, no. 9, 1946, p. 405-411.)

12-81. Industrial Applications of Electronic Techniques. (Continued.) H. A. Thomas. *Engineer,* v. 183, April 4, 1947, p. 295-297.

A survey of electronic eddy currents; dielectric heating; electronic counting and inspection devices. 20 ref.

12-82. Hidden Danger in Lap Joints. Harry M. Spring. *Power,* v. 91, May 1947, p. 103.

Three ways to investigate suspicious joints.

12-83. S.A.E. Metal Numbers Explained. *Industry and Power,* v. 52, May 1947, p. 92, 108.

A simplified table to aid the designer in specifying ferrous alloys suitable for his needs.

12-84. Check Right Angles by Optics. Henry Harrison. *American Machinist,* v. 91. May 8, 1947, p. 110.

Right angles can be checked to within a few seconds of arc by a method widely used in prism manufacture. Applications range from inspecting instrument-maker's squares to the squareness of a machine spindle.

12-85. How to Analyze Production Rejects. Eugene Goddess. *American Machinist,* v. 91, May 8, 1947, p. 111-113.

Shrinkage analysis tells what is wrong with rejected parts and indicates method of attack to reduce or eliminate variables.

12-86. Hardenability—A Revolutionary Basis for Steel Specifications. Fred P. Peters. *Scientific American,* v. 176, May 1947, p. 210-213.

Selection and specification of steels on the basis of hardenability rather than of composition.

12-87. Inspector's Approach to Radiographs of Mild Steel Butt Welds. E. Fuchs, L. Mullins, and S. H. Smith. *Transactions of the Institute of Welding,* v. 10, Feb. 1947, p. 19-36.

A short training course was given to a number of engineering inspectors to help them assess the quality of welds by the interpretation of radiographs. Work was confined to material 1 in. thick, but the findings would apply fully for mild steel up to 1½ in. thick, one example of this thickness being included.

12-88. Strain Gage Testing. *Railway Mechanical Engineer,* v. 121, May 1947, p. 256-257.

Use by the Santa Fe for measuring forces exerted by trains on track structure and for testing locomotive and car parts.

12-89. Black Light Inspection Cuts Tool Costs. Franklin Catlin. *Machine and Tool Blue Book,* v. 43, May 1947, p. 159-160, 164, 166, 168, 170, 172.

General application and theory of black light inspection.

12-90. Are You Inspecting Correctly? G. E. Campbell. *Industry and Welding,* v. 20, May 1947, p. 26-27, 50, 52, 54.

Stress relieving, magnaflux, X-ray, and radiography standards.

12-91. Aluminum Gages for Ducts. *Heating, Piping & Air Conditioning,* v. 19, May 1947, p. 77.

Equivalent galvanized and aluminum sheet thicknesses for ductwork.

12-92. Million-Volt X-Ray Solves Crankshaft and Other Casting Problems. E. H. Grimm. *Automotive and Aviation Industries,* v. 96, May 15, 1947, p. 36-38, 100.

How Auto Specialties Manufacturing Co. does practically all its radiography of both large and small objects with this unit.

12-93. Refined Techniques for Magnetic Particle Inspection of Welds Presented at Conference. *Steel,* v. 120, May 26, 1947, p. 91, 130.

Reviews papers presented at conference sponsored by Magnaflux Corp., in Chicago, May 8 to 9, 1947.

12-94. Supersonic Testing of Steel. R. R. Webster. *American Iron and Steel Institute Preprint,* 1947, 21 p.

Principles and methods of application; prospects for adoption in the steel industry. Believes that supersonic testing will not only complement X-ray, magnetic-powder testing, etc., but in some cases will supersede them.

12-95. Selection and Application of Statistical Methods to Steel Plant Processing Problems. E. L. Robinson and L. G. Eckholm. *American Iron and Steel Institute Preprint,* 1947, 18 p.

An easy-to-understand explanation beginning with elementary considerations.

12-96. Numerical Classification—A Milestone in Standards Progress. Jno. M. Cannon. *Tool Engineer,* v. 18, May 1947, p. 33-34.

Advantages of the A.S.T.E. numerical index system.

12-97. Three-Dimensional Inspection and Layout of Castings. *Western Metals,* v. 5, May 1947, p. 33.

Method in use by General Electric at Pittsfield, Mass. The layout is projected by a lens directly upon the surface of the casting.

12-98. An Oil-Powder Method of Flaw Detection. Bela Ronay. *Welding Journal,* v. 26, May 1947, p. 407-409.

Navy-developed technique is much more convenient than magnetic-powder, X-ray, or fluorescent-oil methods, especially for difficultly accessible locations, as on diesel-engine frames. Penetrating oil containing a red dye is first applied. After wiping the surface dry, a white powder is dusted on. Any cracks present then appear as red lines on a white background.

12-99. A Comparison of Low-Pressure Vessels Constructed in Compliance With Different Codes or Regulations (With Specific Reference to Liquefied Petroleum Gases). R. E. Cecil. *Welding Journal,* v. 26, May 1947, p. 431-433.

The various codes for construction of compressed gas cylinders—I.C.C. or A.S.M.E.-A.P.I. Cylinders constructed according to either are equally safe.

12-100. Electric Gages in Quality Control. Joseph Manuele. *Electrical Engineering,* v. 66, May 1947, p. 441-444.

A descriptive survey.

12-101. Specifications for Malleable Iron Castings. John E. Linabury. *Foundry,* v. 75, June 1947, p. 84, 224, 226, 228-230.

Practical specifications for each of the important properties of these castings. Points out what the customer should expect and demand, and also where he can reduce his quality requirements without essential loss in serviceability.

12-102. Copper-Beryllium Alloy Castings. *Foundry,* v. 75, June 1947, p. 121-122.

Navy Department Specification 46C11.

12-103. Better Rail-Testing Technique. T. B. Thompson. *Railway Age,* v. 122, May 31, 1947, p. 1126-1128.

Methods and equipment used in detecting the presence of internal defects, with particular reference to the practices and experience of the Illinois Central.

12-104. Magnaflux Machine Permits Continuous Inspection of Heavy-Duty Crankshafts. *Automotive and Aviation Industries,* v. 96, June 1, 1947, p. 52, 82.

New 28-ft. machine at General Motors plant in Pontiac, Mich.

12-105. Charts Help Diagnose Quality Progress. Eugene Goddess. *American Machinist,* v. 91, June 5, 1947, p. 96-100.

Proper use of control charts.

12-106. Sine Bars, Blocks, Plates and Fixtures. *American Machinist,* v. 91, June 5, 1947, p. 155.

Commercial Standard CS 141-47, issued by the Division of Trade Standards, National Bureau of Standards; effective as a voluntary standard of the trade after Aug. 15, 1947.

12-107. Shop Talk on Quality Control. Part II. A. W. Ehlers. *Tool & Die Journal,* v. 13, June 1947, p. 72-74, 140, 142, 144, 146.

A simplified explanation.

12-108. Supersonic Testing Detects Flaws in Metal Ten Feet Deep. John G. Smack. *Industry and Power,* v. 52, June 1947, p. 80-83, 112, 114, 116, 118.

Equipment used and case histories.

12-109. Inspection of Exposure Test Panels With Anodic Electrodeposited Coatings. Gustaf Soderberg. *American Society for Testing Materials, Preprint 40,* 1947, 6 p.

Inspection of electrodeposited coatings of zinc and cadmium on steel, exposed out-of-doors. It is believed that other nondecorative anodic coatings behave in the same general manner, and that the same general principles of inspection and evaluation will apply to them. 11 ref.

12-110. Radiographic Specifications. Their Nature, Purpose, and Current Revisions. J. J. Pierce. *Industrial Radiography & Non-Destructive Testing,* v. 5, Spring 1947, p. 21-23, 50.

12-111. Radiography of Radioactive Heavy Metals. Gerold H. Tenney. *Industrial Radiography & Non-Destructive Testing,* v. 5, Spring 1947, p. 33-36.

Method developed at Los Alamos for the radiography of uranium. A resolution of 2½% was achieved up to a thickness of 4 in.

12-112. Use of Magnaflux and Zyglo for Nondestructive Testing. K. E. Glover.

Industrial Radiography & Non-Destructive Testing, v. 5, Spring 1947, p. 41-44.
Methods of applying tests and advantages of each.

12-113. Screening Vs. Sampling in Inspection. Philip G. Fishback. *Tool Engineer*, v. 18, June 1947, p. 18-23.
Advantages and disadvantages of various procedures.

12-114. Mechanical Testing. Part I. Laboratory Organization and Equipment. E. R. Arbon. *Aircraft Production*, v. 9, June 1947, p. 209-212.
Suggestions for improving efficiency.

12-115. Testing Spot Welds. A. M. Armour. *Aircraft Production*, v. 9, June 1947, p. 233-235.
New nondestructive technique for stainless steel which utilizes the change in magnetic permeability caused by welding. A good weld causes a large change, while a bad one does not. A transparent plastic cell containing minute magnetic particles suspended in light oil is used as the test device. On placing the cell on a sheet containing a good spot weld, the magnetized particles form a typical pattern.

12-116. Quality Control and Inspection of Welds. Gilbert C. Close. *Steel Processing*, v. 33, June 1947, p. 350-354.
Design considerations and stress relief by cold working.

12-117. German Radiographic Practices. Herbert R. Isenburger. *Metal Progress*, v. 51, June 1947, p. 961.
Comments critically on three O.T.S. reports on the above.

12-118. Spot Weld Analyzer for Maintenance Work. D. F. Hays. *Iron Age*, v. 159, June 12, 1947, p. 49-51.
An instrument possessing laboratory accuracy, yet easily operated by maintenance men.

12-119. Calculating Commercial Tolerances for Impression Die Forgings. *Iron Age*, v. 159, June 12, 1947, p. 57.
Determined by use of the chart presented.

12-120. A.S.T.M. Specifications for Electrodeposited Coatings. *Automotive and Aviation Industries*, v. 96, June 15, 1947, p. 36-37.
Specifications given cover minimum thickness requirements for electroplated coatings on significant surfaces of finished articles of steel, copper and copper-base alloys, and zinc and zinc-base alloys.

12-121. Small Parts Inspection by Automatic Gaging. C. W. Warren. *Iron Age*, v. 159, June 19, 1947, p. 64-65.
A new type of gaging system known as Limitron. This instrument is completely automatic and is suitable for use by blind, partially deaf, or otherwise disabled personnel with little training.

12-122. A Large Cylinder and Taper Comparator for Gage Measurement. R. H. Field. *Canadian Journal of Research*, v. 25, Section F, May 1947, p. 238-241.
Comparator for accommodating cylinders or cones with maximum diameters of 12 in. and lengths up to 48 in. Special consideration given to ease of construction; no ultra-precision grinding or difficult fits involved.

12-123. An Improved Interferometer for Determining Parallelism Errors in Long End-Gages. L. Graham Turnbull. *Canadian Journal of Research*, v. 25, Section F, May 1947, p. 242-255.
An interferometer determines parallelism of the working faces of end-gages up to 24 in. in length. This new interferometer incorporates kinematic principles and a number of interesting features to permit easy adjustment and operation to the very fine limits necessary. Differences in length of nominally equal end-gages can be determined to an accuracy of 1 or 2 $\times 10^{-6}$ in.

12-124. Radiographic Quality Control in Aluminum Die Casting. R. W. Dively. *Light Metal Age*, v. 5, June 1947, p. 14-15.
Techniques followed at the Hoover Co.

12-125. Standard Type Numbers, Chemical Composition Limits and Ranges for Stainless Steels. *Materials & Methods*, v. 25, June 1947, p. 123.
Revised compositions approved by the American Iron & Steel Institute, April 16, 1947.

12-126. Tolerances for Impression Die Forgings. *Materials & Methods*, v. 25, June 1947, p. 125.
Use of chart is illustrated by two examples.

12-127. Radiography as a Control for Welding Joints in Pipe Lines. Russell G. Rhoades. *Welding Journal*, v. 26, June 1947, p. 497-498.
How it may be applied to field operations; faults to be watched for; techniques to be followed; advantages over other systems of inspection.

12-128. Angular Tolerances of Taper Plug and Ring Gages. W. Richards. *Machinery (London)*, v. 70, June 5, 1947, p. 589-591.
Details of calculation and effect of angular tolerances by diagrams.

12-129. Importance of Radiography in Inspection. E. L. LaGrelius. *Foundry Trade Journal*, v. 82, June 12, 1947, p. 139-140.
Paper read before 1947 Conference of American Foundrymen's Assoc.

12-130. Product Quality Specifications. F. E. Powell. *American Ceramic Society Bulletin,* v. 26, June 15, 1947, p. 181-183.

Bases and functions of standards and specifications. Mechanics of establishing commercial standards through the Division of Trade Standards of the National Bureau of Standards.

12-131. Report of Committee on Wheels. E. E. Chapman. *Railway Age,* v. 122, June 26, 1947, p. 1294D184-1294D188.

Recommendation to increase strength of rims of the 700-lb. chilled-iron wheel by adding ⅛ in. of metal to the underside of the rim and making other minor changes; specifications for location of Brinell hardness checks; changes in specifications in standard and tubular axles when used with roller bearings.

12-132. Specifications for Materials. T. D. Sedwick. *Railway Age,* v. 122, June 27, 1947, p. 1294D229-1294D230.

Committee report proposes new limits for copper content of firebox steel. Subcommittee studies effect of residual alloys and aging of synthetic rubber.

12-133. Electro-Mechanical Gaging. *Product Engineering,* v. 18, July 1947, p. 102-103.

Details of the Limitron, produced by Arma Co., Brooklyn, which combines mechanical gaging with electrical measuring and sorting to overcome the weaknesses in either system.

12-134. Scale Diagram for Relations of Thread Dimensions. John L. Skeehan. *Product Engineering,* v. 18, July 1947, p. 175.

The relations, allowances, and tolerances for pitch diameters of class 1, 2, 3, and 4 fits for a 1-in. diameter, 8-thread bolt-and-nut combination.

12-135. New Plug Gage Simplifies Gaging Operation. *Machine and Tool Blue Book,* v. 43, July 1947, p. 174-176, 178, 180, 182, 184, 186, 188.

Construction of a new plug gage and its application in inspection procedure.

12-136. Precision Measurement. Section II. Instrument Inspection; Part XII. Inspection of Plug and Ring Gages; Introduction to Thread Measurement. Warren Baker. *Machine and Tool Blue Book,* v. 43, July 1947, p. 212-216, 218-220, 222-225.

12-137. Nondestructive Inspection. R. W. Dively. *Die Castings,* v. 5, July 1947, p 56-60.

Use of radiography for testing die castings for internal defects.

12-138. How to Increase Tolerances and Obtain Closer Fits. Edmond E. Bates. *Iron Age,* v. 160, July 3, 1947, p. 58-61.

Taking as an example a precision part on which rejections ran up to 40%, the author shows how statistical control was applied to eliminate scrap, by increasing tolerances while simultaneously improving the quality of the fit.

12-139. End Product Improved by Quality Controlled Methods. *Production Engineering & Management,* v. 20, July 1947, p. 66-74.

Precision forming and machining operations in production of Argus cameras.

12-140. Quality Control. An Important Factor in Competitive Production. Jerome R. Steen. *Steel,* v. 121, July 7, 1947, p. 89, 126, 129.

Its application in production of coated cathodes by Sylvania Electric Products.

12-141. Magnetic Particle Inspection of Weldments. S. L. Henry. *Metal Progress,* v. 52, July 1947, p. 88-90.

A report on a conference of 200 welding engineers held in May by Magnaflux Corp. in Chicago.

12-142. Radiography in the Development of Foundry Practice. G. H. Blackburn. *Walworth Today,* v. 7, March-April 1947, p. 4-5, 8-10.

Descriptive and illustrated.

12-143. Chemistry in Quality Control. Richard B. Faurote. *Aero Digest,* v. 55, July 1947, p. 78, 124.

Use of miscellaneous laboratory techniques in control of the quality of the materials used in aircraft construction.

12-144. Inspection in a Mechanized Foundry. P. Cook. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. B32-B45.

Methods used illustrated by many photographs.

12-145. Induction of Residual Magnetization by an Alternating Current. A. V. Altma and R. I. Ianus. *Journal of Technical Physics (U.S.S.R.),* v. 17, no. 2, 1947, p. 143-152. (In Russian.)

The theoretical basis of the use of alternating current in the Magnaflux method of inspection. 12 ref.

12-146. Investigation of the Action of the "Remanence Deflectoscope" in an Alternating Current. A. V. Altma and R. I. Ianus. *Journal of Technical Physics (U.S.S.R.),* v. 17, no. 2, 1947, p. 153-160. (In Russian.)

Results of an experimental investigation of the effects of different factors on the Magnaflux method of inspection for defects in metals.

12-147. Automatic Inspection System. Charles W. Warren. *Machine Design,* v. 19, July 1947, p. 127-129.

Mechanical-gaging contacts handle

only minute currents which control thyratron amplifier grids.

12-148. Report of Committee A-5 on Corrosion of Iron and Steel. *American Society for Testing Materials Preprint 4,* 1947, 15 p.

Proposed tentative specifications for long terne iron or steel sheets and proposed tentative test method for weight and composition of coatings on long terne sheets by the triple spot test.

12-149. Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought. *American Society for Testing Materials Preprint 14,* 1947, 21 p.

The determination of elongation of sand-cast light alloy test bars, by F. M. Howell. Proposed tentative specifications for aluminum and aluminum-alloy extruded bars, rods, and shapes and for sheet and plate for use in pressure vessels.

12-150. A New Type of Magnetic Flaw Detector. Carlton H. Hastings. *American Society for Testing Materials Preprint 22,* 1947, 9 p.

A practical inspection test method, including instrumentation, for the bore of ferrous tubes or cylinders. This new tool paves the way toward semi-automatic inspection of parts which previously required tedious visual procedures. The possibility of calibrating the instrument to measure surface-flaw depth.

12-151. Supersonic Inspection for Internal Fissures in Cast Rolls. John Dugan. *Steel,* v. 121, July 28, 1947, p. 80-81, 95, 97.

How exact location of fissures on interior of rolls up to 18 ft. long and transverse size and shape of ruptures can be determined by use of the reflectoscope. Details of its construction and operation.

12-152. One-Millionth-Second Radiography and Its Applications. Charles M. Slack and Donald C. Dickson. *Proceedings of the I.R.E.,* v. 35, June 1947, p. 600-606.

Development and principles; applications to various radiographic problems requiring short exposure times such as exploding shells and bombs 11 ref.

12-153. Electronic Comparators. *Automobile Engineer,* v. 37, July 1947, p. 271-272.

Applications to inspection of metals.

12-154. Nondestructive Inspection of Mine Hoist Cable. P. E. Cavanagh and R. S. Segsworth. *Transactions of American Society for Metals,* v. 38, 1947, p. 517-545; discussion, p. 545-550.

Development of a practical nondestructive method for inspection of wire rope while in service. Fundamental relationships between the magnetic and electrical properties and increases in stress in wire ropes. Tests under normal operating conditions to determine whether the fundamental relationships between stresses in wire rope and instrument readings still held at high hoisting speeds.

12-155. Slip Gages. C. G. Greenham. *Discovery,* v. 8, July 1947, p. 216-219.

Their manufacture in Australia and some new types devised during the war.

12-156. Inspection and Despatch in a Steel Wire Mill. C. Coates. *Wire Industry,* v. 14, July 1947, p. 381-383.

Organization and administration of inspection department.

12-157. Quality Control at Cadillac Based on Latest Methods. *Automotive Industries,* v. 97, Aug. 1, 1947, p. 27, 74.

A general description.

12-158. A.S.T.M. Reports on Casting Specifications. Frank G. Steinebach. *Foundry,* v. 75, Aug. 1947, p. 91, 214, 216.

Papers and committee reports presented at annual meeting, June 16 to 20, 1947.

12-159. Present Status of Grinding Wheel Testing. M. Lang and M. Riedl. *Industrial Diamond Review,* v. 7, July 1947, p. 195-197.

A survey of the present position of grinding wheel testing, particularly in Germany since the war.

12-160. Rail Steel Products. Parts I and II. *American Machinist,* v. 91, Aug. 14, 1947, p. 143, 145.

Permissible variations in sizes and shapes.

12-161. Recent Developments in Casing Standards and Design. John Wais, Jr. *Drilling Contractor,* v. 3, June 15, 1947, p. 54-58.

Developments in thread makeup; effect of notching and flattening; high-pressure testing; coupling stresses; and high-strength casing joints in oil-well casing.

12-162. H-Band Method Tailors Steel to Function of Part. P. R. Wray and R. W. Roush. *SAE Journal,* v. 55, Aug. 1947, p. 17-20.

Use of hardenability-band specification method in selection of steels.

12-163. Statistical Methods Applied to the Inspection of Porcelain Enamel. L. S. Kauffman. *Ceramic Industry,* v. 49, Aug. 1947, p. 61-62.

Experiences of the American Stove Co. (Reprinted from *Industrial Quality Control,* Nov. 1946.)

12-164. Effect of Taper Tolerance on Taper Gage Measurements. W. Richards. *Machinery (London),* v. 71, Aug. 7, 1947, p. 150-153.

Illustrated by diagrams.

12-165. Application of Supersonics in Industrial Inspection. James W. Dice. *Engineers' Digest (American Edition)*, v. 4, Aug. 1947, p. 352, 396.

Two basic testing techniques are in use in industry today. The first, or "through transmission" method, employs two transducers, one to send the supersonic vibration into the test piece and the other to receive the transmitted vibration as it emerges from the other side of the piece. The second basic testing technique, the "reflection" method, is known as a Reflectoscope. It sends supersonic vibrations through the material under test and measures the length of time it takes these vibrations to penetrate the material, reflect from the opposite side, or an internal defect, and return to the sending point.

12-166. Testing of Flatness by the Beam Comparator Method. R. Marriner and W. O. Jennings. *Engineer*, v. 184, Aug. 22, 1947, p. 164-165.

Method for testing quickly and with reasonable accuracy large batches of surface plates of the same size uses a sensitive dial indicator to compare the straightness of a succession of generators in the surface under test with that of a known reference straightedge.

12-167. Magnetic Tests of Spot Welds in Stainless Steel. *Engineering*, v. 164, Aug. 22, 1947, p. 177-178, 180.

New inspection technique and equipment. A plastic cell, containing an oil in which magnetic particles are suspended, placed in contact with the spot weld. The particle distribution pattern formed indicates the quality of the weld.

12-168. Transitional Evaluations and Treatment of Experimental Data Subject to Very Wide Scatter. Wendell P. Roop. *ASTM Bulletin*, Aug. 1947, p. 73-76.

Data on the effects of temperature on the ductility of steel illustrate effects of scatter and treatment of numerical results. Methods of analysis and planning of experiments.

12-169. Internal Pressure Chart for Round Stainless Steel Tubing. Benjamin Ostlind. *Product Engineering*, v. 18, Sept. 1947, p. 177.

Diagram shows safe working pressures for small hydraulic stainless steel tubing with outside diameters from ⅛ to 1 in., wall thicknesses from 0.009 to 0.065 in., ultimate tensile strengths from 30.000 to 120,000 psi. and safety factors from 2 to 6. It also shows the weight of stainless steel tubing in pounds per lineal foot.

12-170. Production Thread Gaging. D. E. Mick. *Tool & Die Journal*, v. 13, Sept. 1947, p. 83-84.

Gaging fixture for the rapid inspection of large-pitch-diameter threads by unskilled operators. Variations in the pitch diameter cause an increase or decrease in the amount of air flowing from an orifice. This variation in air flow is measured on a gage which magnifies a tolerance of a few thousandths into a visual reading ranging over several inches.

12-171. The Inspection and Testing of Brazed Joints With Especial Reference to Silver Alloy Brazing. J. L. Christie and A. M. Setapen. *Welding Journal*, v 26, Sept. 1947, p. 767-770.

Several kinds of tests which are frequently used as part of inspection programs, although specific, quantitative tests are not proposed.

12-172. Common-Sense Quality Control. Part I. Ernest L. Fay. *American Machinist*, v. 91, Sept. 25, 1947, p. 76-78.

Application at Waterloo plant of John Deere Co.

12-173. Will That Spring Do Its Job? Clifford W. Kennedy. *American Machinist*, v. 91, Sept. 25, 1947, p. 102-103.

Selection, testing, and quality-control procedures for the manufacturer of devices which utilize springs in their construction.

12-174. Inspection of Pipe-Line Welding by Radiographic Methods. Walter W. Offner. *Oil and Gas Journal*, v. 46, Sept. 20, 1947, p 180-181.

Methods used in construction of 214-mile, 30-in. line.

12-175. Locating Internal Defects. Benson Carlin. *American Gas Association Monthly*, v. 29, Sept. 1947, p. 391-393.

Use of supersonic reflectoscope as nondestructive tester for flaws hidden as deep as 25 ft. in plant equipment

12-176. Unification of Screw Threads. *Institution of Mechanical Engineers Proceedings*, v. 155, 1946, p. 145-200.

Seven papers related to attempts to establish uniform British-U. S. standards, presented at conferences held in 1945. Also an address, discussions, and communications relative to the same, and a report of addresses and discussion at a special meeting in London on Sept. 6, 1946. Papers are as follows: A review of the recent U.S.-Canadian-U.K. conferences, by S. J. Harley. Pipe threads, by E. G. Saunders and J. E. Sears. Acme screw threads and buttress threads, by L. W. Nickols and J. E. Baty. Instrument threads, by G. A. Whipple, W. O. Davis, and A. D. Snutch. The unification of British and American screw threads, by F. H. Rolt and J. E. Sears. Research on fatigue strength of screw threads of different form, by D. G. Sopwith and T. Settle. Rationalization of screw thread series, by J. E.

Sears and W. C. Swift. Addresses were by: Lord Woolton, Arthur Woodburn, William L. Batt and Stanley J. Harley (War Emergency Issue No. 18.)

12-177. Quality Control of Welds by Means of Gamma Rays. S. T. Nazarov. *Avtogennoe Delo (Welding),* June 1947, p 9-12. (In Russian.)

A comparative analysis of two methods for the above, using X and gamma rays, respectively. Despite the high cost of gamma-ray emanating substances, their use is recommended for inspection of thick joints. Methods of inspection used in Russia.

12-178. Reducing Material Costs Through Standardization. H. R. Clauser. *Materials & Methods,* v. 26, Sept. 1947, p. 63-67.

Information contributed by American Standards Assoc., Bell Telephone Laboratories, General Electric Co., General Motors Corp., National Industrial Conference Board, and Westinghouse Electric Corp., is coordinated.

12-179. Precision Measurement. Section II—Instrument Inspection: Part 14—Inspection of Dial Gages and Comparators. Warren Baker. *Machine and Tool Blue Book,* v. 43, Oct. 1947, p. 206, 208, 210-212, 214-216, 218-222, 224, 226.

Theoretical bases and inspection of dial indicators, snap gages, mechanical comparators, reed comparators, electric limit gage, electric comparator, internal comparators, air comparators, optical comparators.

12-180. X-Ray Inspection Promotes Casting Quality Control. E. H. Grimm. *Foundry,* v. 75, Oct. 1947, p. 94-96, 130, 133, 136.

Use of X-ray inspection by Auto Specialties Mfg. Co., St. Joseph, Mich., which specializes in products for the auto industry, chiefly cast-steel crankshafts, malleable-iron castings, and hydraulic and mechanical jacks.

12-181. Beta-Ray Thickness Gage for Sheet Steel. Otto J. M. Smith. *Electronics,* v. 20, Oct. 1947, p. 106-112.

How G-M counters and integrating circuits, responding to absorption of beta rays by steel strip moving over a radiostrontium source, measure thickness over range of 7 to 24 mils. Sheets can be sorted automatically by a mechanical gate after cutting.

12-182. How Statistical Quality Control Is Being Applied at Timken-Detroit Plant. *Automotive Industries,* v. 97, Oct. 1, 1947, p. 29, 64, 67.

Extended to 11 departments and 100 processes, it has produced many good results such as improvement of quality for various reasons and lowering of different cost items.

12-183. An Experiment in the Use of a Standard Limit System. John Loxham. *Institution of Mechanical Engineers Proceedings,* v. 156, Sept. 1947, p. 103-112; discussion, p. 112-125.

Reasons why British industry, for the most part, has failed to use the limit systems recommended by the British Standards Institution. Details of an attempt to use the B.S.I. system.

12-184. "H" Steels; Chemical Composition Ranges. *Metal Progress,* v. 52, Oct. 1947, p. 576-B.

June 1947 revision of composition limits for S.A.E. and A.I.S.I. steels (electric furnace or openhearth bars, billets, or blooms).

12-185. Exposure Chart for Radium Radiography. Herbert R. Isenburger. *Metal Progress,* v. 52, Oct. 1947, p. 640.

12-186. Personal Equation of Men and Machines. John R. Parks. *Tool Engineer,* v. 19, Oct. 1947, p. 43-45.

Men as well as machines have personal equations as far as precision of measurements is concerned. How this fact should be applied to inspection and quality control procedures.

12-187. Involute Checking Machine for Large Helical Gears. D. W. Dudley. *Machinery,* v. 54, Oct. 1947, p. 142-145.

New machine and results obtained with it, which are much more accurate than those obtained by visual inspection.

12-188. Common-Sense Quality Control. Part II. Ernest L. Fay. *American Machinist,* v. 91, Oct. 9, 1947, p. 110-113.

Methods used at Waterloo plant of John Deere Tractor Co.

12-189. Supersonic Examination of Materials. Benson Carlin. *Product Engineering,* v. 18, Oct. 1947, p. 113-118.

Outstanding characteristics of supersonic waves above 20,000 cycles and their use for detecting and locating flaws in metals and plastics.

12-190. Quality Control at Servel, Inc. Douglas M. Considine. *Instrumentation* v. 3, 4th Quarter, 1947, p. 3-7.

Procedures in gas-refrigerator manufacture.

12-191. Importance of Standardizing Specifications for Engineering Materials. Benjamin Melnitsky. *Steel,* v. 121, Oct 20, 1947, p. 106, 127.

Purpose of specifications, simplification of fabrication, keeping information up-to-date.

12-192. Standardization of the Radiographic Examination of Welded Joints in Mild Steel Pressure Vessels. *Transactions of the Institute of Welding, (B.W.R.A. Supplement),* v. 10, Aug. 1947, p 16-20.

Recommendations of the FE.6 committee.

12-193. A New Method of Nondestructive Spot Weld Testing for Stainless Steels. A. M. Armour. *Metallurgia,* v. 36, Sept. 1947, p. 273-275.

New method is claimed to be quick, simple, and reliable. This new inspection technique uses a plastic cell containing a fluid in which are suspended magnetic particles.

12-194. Radiography in the Die Casting Industry. R. W. Dively. *Industrial Radiography & Non-Destructive Testing,* v. 6, Summer 1947, p. 20-21, 39.

Procedures for revealing defects.

12-195. Absorption Measurements for Broad Beams of 1 Millivolt and 2 Millivolt X-Rays. G. Singer, C. B. Braestrup, and H. O. Wyckoff. *Industrial Radiography & Non-Destructive Testing,* v. 6. Summer 1947, p. 22-24.

Experimental data on absorption of X-rays in concrete for wide-angle beams generated by voltages of 1 and 2 millivolts; preliminary data on the variation of the dosage rate with the distance from a protective barrier; and data on concrete protection requirements for 1 and 2 millivolt radiation under certain industrial conditions.

12-196. Internal Gaging With Two-Point Measuring Devices. H. Flury. *Microtecnic,* v. 1, Aug. 1947, p. 83-84. (English section.) (For figures see French section, p. 189-191.)

Instruments and technique. (Translated from the German.)

12-197. Commercial Castings—Plea for Quality Control. *Light Metals,* v. 10, Oct. 1947, p. 539-541.

Comparative surface quality of aluminum alloy castings finished by the various commercial methods. Differences between wrought and cast forms.

12-198. Control of Permanent-Magnet Alloy Quality. J. D. Seaver and R. E. Anderson. *General Electric Review,* v. 50, Oct. 1947, p. 44-47.

Method for maintaining the magnetic quality of small heats, equipment used, technique applied, and operating performance.

12-199. Comment on Article "A Comparison of Low-Pressure Vessels Constructed in Compliance With Different Codes or Regulations". R. K. Cadwell. *Welding Journal,* v. 26, Oct. 1947, p. 906, 922.

Discussion of article by R. E. Cecil, in May issue.

12-200. Mobile Laboratory Measures Surface Finish in the Shop. A. A. Goodman. *American Machinist,* v. 91, Oct. 23, 1947, p. 104-106.

Use of mobile surface-finish analyzer by steam division of Westinghouse. All necessary instruments and accessories are kept in a cabinet built into the unit which is moved about like a hand truck.

12-201. Electrical Steel. *American Machinist,* v. 91, Oct. 23, 1947, p. 139, 141.

Descriptions and types, standard mill practices, and special manufacturing practice.

12-202. Nondestructive Spot Weld Testing for Stainless Steels. *British Steelmaker,* v. 13, Oct. 1947, p. 531-532.

Use of Metroflux captive-fluid magnetic-detector cell.

12-203. Radiography Reveals Internal Quality of Die Castings. R. W. Dively. *Steel,* v. 121, Nov. 3, 1947, p. 88-89, 121.

Use of equipment manufactured by General Electric X-Ray Corp. for 100% inspection for defects such as porosity, cold shuts, inclusions, and shrinks.

12-204. Hardenability Bands for H-Steels. *American Machinist,* v. 91, Nov. 6, 1947, p. 155, 157, 159.

How to use them. Graphs for 12 of the steels.

12-205. Engineering and Manufacturing Standards. W. L. Matthew. *Product Engineering,* v. 18, Nov. 1947, p. 81-85.

Organization and maintenance of an engineering standards system. Sample standards pages and forms.

12-206. Ultrasonic Resonance Applied to Nondestructive Testing. Wesley S. Erwin and Gerald M. Rassweiler. *Review of Scientific Instruments,* v. 18, Oct. 1947, p. 750-753.

Ultrasonic vibrations of continuously varying frequency are applied to the part under test, which is set into longitudinal vibration at its natural frequencies. The consequent reaction is used to produce visible marks on a cathode-ray screen from which thickness of the part may readily be deduced.

12-207. Graphical Correlation—Its Application to Steel Mill Problems. Charles R. Taylor. *Iron Age,* v. 160, Nov. 6, 1947, p. 78-84.

The graphical-correlation method of statistical control appears to present a means whereby usual mathematical methods can be sidetracked. The solution of a specific steel-mill problem is presented to indicate the applicability of the method, as well as to suggest its potentialities.

12-208. Postwar S.A.E. Steels. *SAE Journal,* v. 55, Nov. 1947, p. 17-23.

Tables to appear in 1948 S.A.E. Handbook include 55 new compositions; 47 compositions have been deleted. Compositions and corresponding A.I.S.I. numbers are given.

12-209. Standard Steels—Wrought A.I.S.I. Types. Part II. *Machine Design,* v. 19, Nov. 1947, p. 151-163.

Tables and charts resulting from cooperative work of S.A.E. and A.I.S.I. All bands apply to steel in the as-quenched condition. Explanatory matter.

12-210. X-Ray Examination of Butt Welds. W. D. Garrick. *Engineering,* v. 164, Oct. 24, 1947, p. 404-407.

The examination of welds in pressure vessels. Although based on experience with welded drums for Yarrow boiler installations, this summary is equally applicable to all forms of fusion-welded pressure vessels. (Presented at meeting of Section G of the British Assoc., Dundee, Sept. 2, 1947.)

12-211. Crack Detection. *Nature,* v. 160, Oct. 25, 1947, p. 556-557.

Reviews papers presented at symposium on methods of crack detection held by the Industrial Radiology Group of the Institute of Physics, July 18-19, 1947.

12-212. Hardenability Bands for H-Steels. Parts IV to VI. *American Machinist,* v. 91, Nov. 20, 1947, p. 143, 145, 147.

Series of charts for 4150H to 8647H.

12-213. B.S. 970: (1947) Wrought Steels —EN Series. *Engineering Materials and Processes,* v. 5, Oct. 1947, p. 145-146.

Specification changes since 1942.

12-214. Estimated Properties of Common Compositions of Hot Rolled and Cold Drawn Carbon-Steel Bars. *ASTM Bulletin,* Oct. 1947, p. 31-33.

Changes in specifications. A-107 and A-108. Data obtained during experimental work.

12-215. Sensitometry of Radiographic Films Exposed to Two-Million-Volt X-Rays. E. A. Burrill and W. W. Buechner. *ASTM Bulletin,* Oct. 1947, p. 52-57.

A study of eight commercial films results in charts that are useful for predicting radiographic exposures for any film density and speed and for any object thickness. They permit radiography of very heavy metal sections with confidence. (Presented at Annual Meeting of A.S.T.M., Atlantic City, N. J., June 16, 1947.)

12-216. Zinc-Base Die Casting. A. W. Sundwick. *Western Metals,* v. 5, Nov. 1947, p. 31-35.

Common surface defects.

12-217. Hardenability Bands for H-Steels. Parts VII and VIII. *American Machinist,* v. 91, Dec. 4, 1947, p. 135, 137.

Curves for H-steels from 8650H to 9445H.

12-218. Can Hardenability Bands Be Narrower? L. W. Cashdollar. *Metal Progress,* v. 52, Nov. 1947, p. 825-826.

Some calculations and charts indicate that narrowing of the bands would be desirable and probably feasible.

12-219. Nondestructive Testing. A. M. Armour. *Iron and Steel,* v. 20, Nov. 1947, p. 525-527.

New method for inspection of spot welds in stainless steels using captive-fluid detector cells and permanent magnets.

12-220. The Fluoroscope as a Flaw Detector. L. Sanderson. *Chemical Age,* v. 57, Nov. 1, 1947, p. 599-600.

An effective substitute for radiography.

12-221. Automatic Gaging by Electronics. *Western Machinery and Steel World,* v. 38, Nov. 1947, p. 90-91.

Use of instrument called the Limitron for gaging small precision parts.

12-222. Multiple Correlation Applied to Steel Plant Problems. W. T. Rogers. *Blast Furnace and Steel Plant,* v. 35, Nov. 1947, p. 1375-1376.

Condensed from paper presented to American Society for Metals, Chicago, Oct. 17-22, 1947.

12-223. Some New Types of Slip Gages. C. G. Greenham. *Engineering,* v. 164, Nov. 7, 1947, p. 436.

Four new types of slip gages designed in Australia. Two half-size gages, differing in size by the correct amount, are wrung on top of a suitable combination, so that the final combination can be used both as a "go" and a "no go" gage. (To be continued.)

12-224. Design of an Ultrasonic Analyzer. *Electronics,* v. 20, Dec. 1947, p 102-105.

Equipment for nondestructive inspection of metal strip and production testing of uniform parts comprises a noise generator, transmitter, piezoelectric transducers, and a recording receiver. Flaw location can be automatically marked.

12-225. Towards Quality Production. D. R. Johnson. *Machinery Lloyd (Overseas Edition),* v. 19, Nov. 8, 1947, p. 97-102.

The importance of inspection procedures for different production jobs.

12-226. Precision Measurement. Section II—Instrument Inspection. Part 15—Measurement With Optical Flats: Inspection and Calibration of Gage Blocks. (Continued.) Warren Baker. *Machine and Tool Blue Book,* v. 43, Dec. 1947, p. 198-200, 202-204, 206-209.

12-227. Measuring With Air. William Weeks. *Tool & Die Journal,* v. 13, Dec. 1947, p. 65-67, 120.

Use of constant-pressure air gages to measure critical dimensions of miscellaneous parts and products.

12-228. 2,000,000-Volt X-Ray Installation. Lovell Cardenas. *Iron and Steel Engineer,* v. 24, Dec. 1947, p. 89-96; discussion, p. 97-99.

Installation at Philadelphia; modern safety provisions.

12-229. Vector Fields to Locate Deep-Seated Defects in Steel. Robert M. Killen. *Materials & Methods,* v. 26, Dec. 1947, p. 66-67.

How magnetic powders are used to locate subsurface flaws in welds, sheet steel, and thin castings by use of superimposed electrical fields.

12-230. Measuring Diameter of Fine Wire. Robert W. Carson. *Wire and Wire Products,* v. 22, Dec. 1947, p. 967-971, 995, 996.

Advantages and limitations of various types of diameter-measuring instruments, with an analysis of the effect of anvil pressure on accuracy of measurement. (Prepared for Wire Association Annual Meeting, Oct. 22, 1947, Chicago.)

12-231. Hydraulic-Electric System Expedites Inspection in Machine. Walter E. Bock. *Machine Design,* v. 19, Dec. 1947, p. 107-111.

Automatic magnaflux machine and its use for inspection of crankshafts and camshafts.

12-232. Purchased-Part Quality Controlled. Ernest L. Fay. *American Machinist,* v. 91, Dec. 18, 1947, p. 98-100.

Application of statistical methods to inspection of incoming parts at John Deere Tractor Co.

12-233. Clearances for Fine-Pitch Gears. *American Machinist,* v. 91, Dec. 4, 1947, p. 149, 151.

Standard dimensions of tooth parts for 20°-pressure-angle, fine-pitch gears.

12-234. X-Ray Inspection of Aluminum Jet Engine Castings. W. A. Mader. *Iron Age,* v. 160, Dec. 11, 1947, p. 90-93.

Application of X-ray inspection methods and the benefits derived therefrom in the development of optimum casting procedures, as a guide in the repair of imperfect pieces, and in reducing machine-shop losses due to foundry defects to below 0.5%.

12-235. Shadowgraph a Sample to Find Tool Errors. C. H. Bodner. *American Machinist,* v. 91, Dec. 18, 1947, p. 87-90.

By machining a "section" of the piece, along with a trial lot, tool deficiencies can be found immediately by an optical-comparator method.

12-236. L'Examen Magnétoscopique. (Magnetoscopic Examination.) A. Gaubert. *Soudure et Techniques Connexes,* v. 1, July-Aug. 1947, p. 137-152.

Sensitivity factors and practical test methods; typical applications.

12-237. La Practica del Controllo Statistico Della Qualita in Metallurgia. (The Practice of Statistical Control of Quality in Metallurgy.) E. Hugony. *Alluminio,* v. 16, July-Aug. 1947, p. 284-292.

12-238. Methode de Depistage des Criques et Defauts de Surface sur les Pieces de Fonderie. (Method of Discovering Cracks and Surface Defects in Cast Objects.) Jean Duport. *Fonderie,* no. 21, Sept. 1947, p. 811-812.

Magnetic-inspection method.

12-239. The Comparator: Its Use, Its Working. B. Humbert. *Microtechnic (English Section),* v. 1, Oct. 1947, p. 110. (Translated from the French.)

Different dial gages made in Switzerland and their uses. (To be continued. For illustrations, see French Section, p. 241-244.)

12-240. Eliminating Axle Breakage. E. D. Hall. *Railway Mechanical Engineer,* v. 121, Dec. 1947, p. 710-713.

Use of Sperry reflectoscopes to detect flaws in axles and crank pins.

12-241. Uses of the DuMont Cyclograph for Testing of Metals. R. S. Segsworth. *Electronic Methods of Inspection of Metals (American Society for Metals),* 1947, p. 54-70.

Equipment and typical applications in nondestructive testing.

12-242. Supersonic Methods of Metal Inspection. E. O. Dixon. *Electronic Methods of Inspection of Metals (American Society for Metals),* 1947, p. 71-96.

Principles, applications, methods, and equipment, especially the Brush Hypersonic Analyzer.

12-243. Determination of Seams in Steel by Magnetic Analysis Equipment. Charles M. Lichy. *Electronic Methods of Inspection of Metals (American Society for Metals),* 1947, p. 97-106.

Technique and equipment used.

12-244. The Advantages and Limitations of Gamma-Ray Radiography on Small Steel Castings. R. H. Frank. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 102-113.

Previously annotated in R.M.L., v. 2, 1945.

12-245. Steel Castings Radiography. E. L. LaGrelius and C. W. Stephens. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 141-158.

Previously annotated in R.M.L., v. 2, 1945.

12-246. Gamma Ray Radiography; Its Advantages and Disadvantages. R. A.

Gezelius. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 333-335.

Previously annotated in R.M.L., v. 2, 1945.

12-247. Nondestructive Testing of Steel Castings; Report of the Steel Division Committee of A.F.A. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 363-364.

13 references.

12-248. Other Nondestructive Methods of Testing. John W. Juppenlatz. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 365-368.

Previously annotated in R.M.L., v. 3, 1946.

12-249. Inspection of Steel Castings. C. F. Rohlkoetter. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 406-409.

Previously annotated in R.M.L., v. 3, 1946.

12-250. Inspection in a Mechanized Foundry. P. Cook. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. B32-B45.

12-251. Report of Committee A-1 on Steel. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 98-137.

Recommendations for changes in specifications and testing methods. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

12-252. Report of Committee A-3 on Cast Iron. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 138-140.

Recommendations for changes in specifications and testing methods. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

12-253. Report of Committee B-1 on Wires for Electrical Conductors. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 188-190.

Recommendations for changes in specifications. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

12-254. Report of Committee B-2 on Nonferrous Metals and Alloys. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 191-193.

Recommendations for changes in specifications. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

12-255. Report of Committee B-4 on Electrical-Heating, Electrical-Resistance and Electric-Furnace Alloys. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 198-201.

Recommendations for changes in specifications and test methods. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

12-256. Report of Committee B-5 on Copper and Copper Alloys, Cast and Wrought. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 202-221.

Extensive recommendations for changes in specifications and test methods. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

12-257. Report of Committee B-7 on Light Metals and Alloys, Cast and Wrought. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 259-264.

Recommendations for changes in specifications and test methods. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

SECTION XIII

PYROMETRY

Temperature Measurement and Control

13-1. Improvement in Design of Immersion Pyrometers for Liquid Steel. D. Manterfield and J. R. Thurston. *Blast Furnace and Steel Plant,* v. 34, Dec. 1946, p. 1520-1521, 1535-1536.

Details of design for a permanent or semipermanent immersion thermocouple installation which may be attached to the furnace backwall. This design eliminates several difficulties inherent in previous procedures. The thermocouple and protection tube is immersed by means of a pulley and hand-winch apparatus.

13-2. Recording Surface Heats With Radiation Pyrometer. *Steel,* v. 119, Dec. 30, 1946, p. 74.

Radiation type of heat recorder takes the external temperature of nearly white-hot slabs of steel as they pass in review in the heating furnace preparatory to entrance in rolling mills. In addition to making certain that slabs reach the prescribed temperatures, pyrometer aids research in the design of effective furnaces, locating heat leaks and other points of inefficiency. Long-handled, malletlike instrument, which may be operated by one man, is designed to perform successfully up to a slab surface temperature of 2400° F.

13-3. What We Have Learned About Upkeep of Pyrometric Equipment. P. L. Stapleton. *Factory Management and Maintenance,* v. 104, Dec. 1946, p. 140-143.

Organization of maintenance and repair activities for the 2400 pyrometric instruments in General Electric's Schenectady plant.

13-4. Instrumentation—A Must at the Ford River Rouge Plant. *Instrumentation,* v. 2, Jan-Feb. 1947, p. 3-7.

Instrumentation includes that applied to steel production and heat treating operations.

13-5. High Nickel-Chromium Alloys Increase Thermocouple Life. *Instrumentation,* v. 2, Jan-Feb. 1947, p. 29-30.

Gas tightness and resistance to high-temperature corrosion; time lag of thermocouples protected by these alloy tubes.

13-6. A Photographic Investigation of the Brightness Temperatures of Liquid Steel Streams. J. A. Hall. *Journal of the Iron and Steel Institute,* v. 155, Jan. 1947, p. 55-85.

Motion pictures were taken of molten steel in tapping and casting operations A density-temperature calibration of the film was made in order to investigate the relationships of brightness and temperature. Optical pyrometer observations on a flickering field or on a nonuniform field are likely to be about 10° C. higher than actual temperatures. Better agreement between optical pyrometer values and photographic values was obtained with casting than with tapping streams. Use of a pyrometer with a larger field of view than the normal disappearing filament type is recommended.

13-7. Selection and Installation of Thermocouple Extension Lead Wire. *Iron Age,* v. 159, March 6, 1947, p. 82-84.

The various factors governing selection of the proper kind of lead wire and a few simple rules to be followed in order to insure accurate measurement and control.

13-8. Temperature Instruments of the Future. Paul G. Weiller. *Instruments,* v. 20, March 1947, p. 231-233.

The author speculates on what the "ideal" instrument of the future will be like, and describes the various features which he believes should be perfected and incorporated into such an instrument.

13-9. High Nickel-Chromium Alloys Increase Thermocouple Life. E. A. Murphy.

Materials & Methods, v. 25, March 1947, p. 133.

A number of nickel-chromium-iron alloys were investigated for use as thermocouple protection tubes. For the majority of industrial applications, Inconel (80% Ni, 14% Cr, 6% Fe) was most satisfactory.

13-10. Measurement of Temperature in the Openhearth. John R. Green. *Blast Furnace and Steel Plant*, v. 35, March 1947, p. 344-347.

Involves measurements in, over, around and through hearth. Platinum thermocouple method, air purged sighting tube method, roof temperature measurement. (To be continued.)

13-11. A Multiple Point Repeating Switch for Use With a Recording Potentiometer. Aaron M. Altschul. *Review of Scientific Instruments*, v. 18, March 1947, p. 195-197.

Switch for obtaining a temperature record from each of 22 locations once every hour or two. Two single-point recorders.

13-12. The Selection and Installation of Thermocouple Extension Lead Wires. C. C. Roberts and C. A. Vogelsang. *Industrial Heating*, v. 14, March 1947, p. 370-372, 374, 376, 378, 380, 382.

Layout of a typical modern installation of extension lead wire for a heat treating department. Use of improperly installed lead wires impairs both the accuracy of the temperature indication and control of the process variable. Careless wiring, poorly soldered or unsoldered splices, carelessly taped splices, or mechanical abrasion of the lead wire insulation, can result in either complete or partial failure of the pyrometer system.

13-13. A Symposium on the Contamination of Platinum Thermocouples. *Journal of the Iron and Steel Institute*, v. 155, Feb. 1947, p. 213-234.

Includes the following papers by various authors submitted by the Liquid Steel Temperature Sub-Committee of the Ingot Committee of the Iron and Steel Institute: An Investigation of Embrittlement of Platinum-Rhodium Wire in the Heads of Liquid-Steel Pyrometers; Fracture of Platinum and Platinum-13% Rhodium Wires Used in the Immersion Thermocouple; An X-Ray Investigation of the Embrittlement of Platinum and Platinum-Rhodium Wires; Contamination and Failure of Rare Metal Thermocouples; Embrittlement of Platinum and Platinum-Rhodium Thermocouples; and An Examination of the Microstructure of Contaminated and Embrittled Platinum and Platinum-Rhodium Wires.

13-14. Instrument for Measuring Openhearth Flame Radiation. E. M. Yard. *Blast Furnace and Steel Plant*, v. 35, April 1947, p. 46, 48, 72, 85.

The effect of radiation on heat transfer in the openhearth. A simple, portable, and rugged instrument (designed and built for use by one man) is believed to be more practical for the average plant than the usual complicated and expensive set-up. An unusually sensitive vacuum-tube voltmeter was designed to measure the e.m.f. generated by the pyrometer. Sample readings and how they are used as an aid in the control of furnace settings.

13-15. Measurement of Temperature in the Openhearth. Part II. John R. Green. *Blast Furnace and Steel Plant*, v. 35, April 1947, p. 443-447.

The measurement of "flame character" or "radiating power". This is important because a high percentage of heat transfer between furnace and bath is by radiation. Measurement of radiation at various points in the furnace, using either permanent or portable instruments. Major emphasis is placed on measurement of the temperature of the top course of the checkers by means of a Brown radiamatic instrument connected to a recorder, and its connection to an automatic system for regenerator reversal control.

13-16. Immersion Thermocouple, Simplified Protection Tube. W. A. Spindler. *American Foundryman*, v. 11, April 1947, p. 125-126.

Thermocouple devised to facilitate and improve the accuracy of temperature measurements when taking the temperature of the molten metal in the electric rocking furnace; and also while following the drop in temperature of the metal in the ladle, when it is desired to pour at a certain temperature.

13-17. Nickel Alloys Form Multihelix Thermometer Element. *Product Engineering*, v. 18, April 1947, p. 98.

Invar and another nickel alloy, when welded together and rolled to proper thickness, form an excellent bimetallic thermometer. Invar is a nickel alloy with practically no expansion at ordinary temperatures, and the other alloy has a high and constant rate of expansion, and is not appreciably affected either by humidity or by constant flexing.

13-18. Obtaining of Linear Furnace Temperature Increases. V. F. Oreshko. *Journal of Applied Chemistry (U.S.S.R.)*, v. 19, no. 8, 1946, p. 849-851. (In Russian.)

A new method developed by N. M. Karaviev for obtaining linear increases in furnace temperatures, which is often necessary, especially in research. The method was investigated

theoretically and its application to a number of research problems indicated.

13-19. Un Régulateur de Température de Précision. Application a un Calorimètre Adiabatique. (A Precision Temperature Controller. Application of an Adiabatic Calorimeter.) Louis Weil. *Comptes Rendus*, v. 224, March 17, 1947, p 810-812.

A newly developed temperature controller having direct regulation. All mechanical drives are replaced by a system of photo-electric cells with a galvanometer. In connection with a calorimeter this control has measured heat generated at rates of less than 0.002 cal. per min.

13-20. Thermocouple Protecting Tubes. *Materials & Methods*, v. 25, April 1947, p. 143.

Recommendations for various atmospheres and media.

13-21. Platinum Thermocouples. *Metal Industry*, v. 70, April 18, 1947, p. 266, 271.

Research progress in calibration and contamination in service.

13-22. Instrumentation of Openhearth Steelmaking Furnaces. *Metallurgia*, v. 35, April 1947, p. 278.

Suggests list of control instruments for new steelmaking installations and the modernization of existing installations.

13-23. A Photo-Electric Roof Pyrometer for Openhearth Furnaces. T. Land. *Journal of the Iron and Steel Institute*, v 155, April 1947, p. 568-576.

Photo-electric pyrometer, employing a selenium barrier-layer photo-electric cell, has been developed for the measurement of openhearth furnace roof temperatures. The reasons are given for choosing a photo-electric instrument in preference to other types of radiation pyrometers. The construction, installation, and operation of the pyrometer, and the errors introduced in the measurements by the presence of flame in the furnace. 12 ref.

13-24. Emissivity of Molten Iron and Steel. D. Knowles and R. J. Sarjant. *Journal of the Iron and Steel Institute*, v. 155, April 1947, p. 577-592.

Emissivity of molten iron and steel has been determined under a wide range of laboratory and workshop conditions. Observations of true temperature were made with immersion thermocouples, and correlated with apparent temperatures indicated by disappearing-filament optical pyrometers. Variations of emissivity were studied in relation to true temperature, the composition of the molten metal, the type of steelmaking process, the character of the lining of either melting furnace or ladle, and the casting conditions. Influence of carbon, silicon, aluminum, chromium, nickel, copper, and manganese content. 12 ref.

13-25. A Radiation Pyrometer for Openhearth Bath Measurements. H. T. Clark and S. Feigenbaum. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.*, v. 29, 1946, p. 229-241; discussion, p. 241-243.

Pyrometer employs a radiation device, mounted inside an open-end steel tube, sighted on the liquid steel. Compressed air keeps the orifice free from molten slag and steel. A convenient method for standardizing the pyrometer. 18 ref.

13-26. Temperature Determination of Molten Metal. G. Vennerholm and L. C. Tate. *American Foundryman*, v. 11, May 1947, p. 56-63.

Various methods tried to measure accurately the temperature of the liquid metal in the furnace and the results of an investigation carried out at the Ford Motor Co.

13-27. Furnace Temperature Control for Large Steam-Generating Units. Otto de Lorenzi. *Blast Furnace and Steel Plant*, v. 35, June 1947, p. 724-729.

Bypass damper provides constant temperature at the superheater outlet. Desuperheaters are used to bring about a reduction in temperature of the superheated steam. Furnace wall cleanliness provides effective absorbing of a large portion of the heat. (Portion of a paper presented at meeting of the American Society of Mechanical Engineers, Dec. 2 to 6, 1946.)

13-28. A Photo-Electric Pyrometer for a Small High-Frequency Induction Furnace. T. Land and H. Lund. *Journal of the Iron and Steel Institute*, v. 156, May 1947, p. 75-77.

Simple pyrometer uses a barrier-layer-type photo-electric cell for measuring the temperature of molten permanent-magnet alloys in a small high-frequency induction furnace. The pyrometer will measure the true temperature of the charge within $\pm 10°$ C. for certain alloys.

13-29. Steel-Surface Pyrometer Developed by U. S. Steel Research Laboratory. *Industrial Heating*, v. 14, May 1947, p. 786, 788.

Details of new radiation-type instrument for slab-surface temperatures up to 2400° F.

13-30. Liquid Steel Streams. J. A. Hall. *Iron and Steel*, v. 20, May 23, 1947, p. 218-228; discussion, p. 290-291.

Results of a photographic investigation of brightness temperatures. 23 ref.

13-31. Platinum Thermocouples. *Iron and Steel*, v. 20, May 23, 1947, p. 232-240.

Symposium on their contamination.

Embrittlement of Pt-Rh wire in the heads of liquid-steel pyrometers, by T. Land. Fracture of Pt-13% Rh wires used in the immersion thermocouple, by L. Reeve and A. Howard. X-ray investigations, by H. J. Goldschmidt and T. Land. Contamination and failure of rare-metal thermocouples, by D. Manterfield. Embrittlement of Pt and Pt-Rh thermocouples, by J. C. Chaston, R. A. Edwards, and F. M. Lever. Examination of the microstructure of contaminated and embrittled Pt and Pt-Rh wires, by R. C. Jewell.

13-32. Heating and Melting Furnace Controls. C. G. Bigelow, Jr. *Iron and Steel Engineer*, v. 24, June 1947, p. 44-49; discussion, p. 49.

The costs of the various types of controls, and evaluation of their economic advantages. A calculation based on estimates shows savings of almost $10,000 per year for a 40-ton continuous furnace.

13-33. Temperature Scale of the Blowing-Tube Bath Pyrometer. L. O. Sordahl and J. W. Bain. *Iron and Steel Engineer*, v. 24, June 1947, p. 60.

Condensation of paper presented before American Institute of Mining and Metallurgical Engineers. Cincinnati, Ohio, April 21 to 23, 1947.

13-34. Closer Control of Blast Furnaces Through Increased Instrumentation. *Industrial Heating*, v. 14, June 1947, p. 954, 956, 958, 960.

Possibilities of more closely controlling blast furnaces through increased instrumentation.

13-35. Instrumentation. *Iron and Steel*, v. 20, June 1947, p. 310.

Open-Hearth Instruments Sub-Committee of Steelmaking Div. of British Iron and Steel Research Assoc. gives recommendations for openhearth furnaces.

13-36. How to Select and Install Pyrometer Leadwires. C. C. Roberts and C. A. Vogelsang. *Power*, v. 91, July 1947, p 69-71, 150, 152.

13-37. Accurate Control Spells Success in Heat Treating. C. C. Roberts. *American Machinist*, v. 91, July 17, 1947, p. 139-140.

Control instruments for salt-bath furnaces operated on various heat treatments.

13-38. Monitors for Molten Metals. John Markus. *Scientific American*, v. 177, Aug. 1947, p. 64-66.

Use of electronic controlling and measuring devices for metallurgical furnaces.

13-39. Electronic Temperature Recorders. George M. Chute. *Instrumentation*, v. 2, July-Aug. 1947, p. 11-13.

Circuits and operation.

13-40. Automatic Control in Commercial Heat Treating Plant. C. C. Roberts. *Instrumentation*, v. 2, July-Aug. 1947, p 23-24.

Controls for draw furnace, isothermal quenching furnace, hardening furnace, high-temperature furnace, preheat and hardening furnace, liquid carburizing furnace.

13-41. New Thermocouple Increases Aluminum Casting Production. *Instrumentation*. v. 2, July-Aug. 1947, p. 25-26.

New portable thermocouple assembly for molten aluminum.

13-42. Instruments—Key Production Tools at Bethlehem Steel. Frederick R. Pullen. *Instrumentation*, v. 2, July-Aug. 1947, p. 27-30.

Maintenance of tools and duties of various maintenance officers.

13-43. Temperaturmätning i Stalbad. (Temperature Measurement in Steel Baths.) Sven Fornander. *Jernkontorets Annaler*, v. 131, no. 7, 1947, p. 225-242.

The quick-immersion method for temperature measurements in liquid steel. A pyrometer of British design gave good reproducibility and accuracy. 80 measurements could be made with one hot junction without any measurable change in e.m.f. 17 ref.

13-44. The "Why" of Bimetal Thermometers. A. H. Lamb. *Power Plant Engineering*, v. 51, Sept. 1947, p. 90-92.

Development of the present instruments. selection of alloys; fabrication procedures.

13-45. Selecting and Installing Thermocouple Leadwires. C. C. Roberts and C. A. Vogelsang. *Power Plant Engineering*, v. 51, Sept. 1947, p. 110-112, 124.

13-46. The Selection of Thermocouple Extension Leadwire. C. C. Roberts and C. A. Vogelsang. *Steel Processing*, v. 33, Sept. 1947, p. 568-571.

13-47. A Fundamental Improvement in Temperature Measurement and Control. Hans W. Bluethe. *Metal Progress*, v. 52, Oct. 1947, p. 591-593.

How invention of an electronic circuit actuated by movement of a small metal vane in a high-frequency electrical field facilitated operation of control valves and switches by measuring instruments.

13-48. Installation and Use of Instruments on Openhearth Melting Furnaces. R. C Baker. *Journal of the Iron and Steel Institute* v. 157, Sept. 1947, p. 81-88.

The installation and development of recording and control instruments for routine use in a small openhearth plant. Recording of furnace-roof temperature and gas and air flows on one chart and an experimental automatic crown-temperature control.

13-49. Measuring and Recording Dew Point Temperatures of Industrial Gases. Nelson Gildersleeve. *Instrumentation,* v. 3, 4th Quarter, 1947, p. 12-14.

Instruments and procedures. Applications to miscellaneous processes, including heat treating.

13-50. Pyrometry and Its Application in Porcelain Enameling Plants (Concluded.) *Ceramic Forum,* v. 14, Sept. 1947, p. 2; Oct. 1947, p. 2-3, 6.

13-51. Instrumentation. Ralph H. Munch. *Industrial and Engineering Chemistry,* v. 39, Oct. 1947, p. 95A-96A.

Design of thermowells—the protective casings around thermocouples.

13-52. Pyrometer Tips. A. J. Benedict. *Industrial Heating,* v. 14, Oct. 1947, p. 1624, 1648.

Tips for the maintenance man.

13-53. Symposium on the Contamination of Platinum Thermocouples. Section I—An Investigation of the Embrittlement of Platinum-Rhodium Wire in the Heads of Liquid-Steel Pyrometers. Section II—Fracture of Platinum and Platinum-13% Rhodium Wires Used in the Immersion Thermocouple. *Industrial Heating,* v. 14, Oct. 1947, p. 1650, 1652.

Summarizes two papers presented to Liquid Steel Temperature Sub-Committee of the British Iron and Steel Research Assoc. (To be continued.)

13-54. Thermocouple for Molten Steel. V. S. Kocho. *Factory Laboratory (U.S.S.R.),* v. 13, April 1947, p. 498. (In Russian.)

The instrument utilizes a short quartz protecting tube attached to a graphite sleeve, which, in turn, fits over a long, bent steel tube.

13-55. Proportioning Temperature Controller. D. Lazarus and A. W. Lawson. *Review of Scientific Instruments,* v. 18, Oct. 1947, p. 730-733.

Unbalance voltage from a potentiometer is amplified by a simple circuit including a 60-cycle polarized interrupter, and used to control the extent of the on-off cycle of a furnace. The circuit responds to a change in input voltage of less than 4 microvolts. Long-term stability is limited to about 40 microvolts.

13-56. Applying Bimetal Thermostats. J. O. Moorehead. *Product Engineering,* v. 18, Nov. 1947, p. 123-127.

Basic factors in selecting and applying creep and snap-action thermostats. Eight application considerations; direct and remote-mounted thermostats; current and voltage-type compensation; effect of cup and plate-type mounting on performance.

13-57. The Theory of Unstable Processes in a Thermocouple. V. E. D'iachenko and A. F. Mal'nev. *Journal of Technical Physics (U.S.S.R.),* v. 17, July 1947, p. 855-870. (In Russian.)

Equations are derived for the semistable process, thermal hysteresis, and the inertia of the thermocouple. A theory for its behavior in a field of radiant energy of periodically varying intensity is presented.

13-58. Continuous Control Thermoregulator. P. Wright. *Journal of Scientific Instruments,* v. 24, Oct. 1947, p. 258-261.

Conditions determining constancy of furnace temperature. A continuous control thermoregulator of the photocell-thyratron type in which the controlling influence is applied through a saturated choke. Records obtained with different furnaces show that variations in supply voltage are mainly responsible for furnace temperature fluctuations, and that the thermoregulator reduces these fluctuations by a factor of 1/100.

13-59. Precision of Heat Transfer Measurements With Thermocouples—Geometric Errors. W. A. Mohun and W. S. Peterson. *Canadian Chemistry and Process Industries,* v. 31, Oct. 1947, p. 908-913.

A precision method of embedding thermocouples in a tube wall to measure its surface temperature; errors involved in such measurement. Derived from a study of the cooling of the Canadian atomic energy pile.

13-60. Setting Oven Temperatures by Phasing in Thyratron Circuit. *Electronic Industries & Electronic Instrumentation,* v. 1, Nov. 1947, p. 14-15.

Circuits for setting oven temperatures.

13-61. The Ultimate Sensitivity of Radiation Detectors. R. Clark Jones. *Journal of the Optical Society of America,* v. 37, Nov. 1947, p. 879-890.

A thermodynamical treatment of radiation detectors, including thermocouples, bolometers, and radiometers.

13-62. Pyrometer for Measuring Temperature of Hot Gases. *Industrial Heating,* v. 14, Dec. 1947, p. 2012.

New pyrometer developed at National Bureau of Standards.

13-63. Remote Control of Continuous Slab Heating Furnaces. C. E. Duffy. *Iron and Steel Engineer,* v. 24, Dec. 1947, p. 70-74; discussion, p. 74-75.

Control installation at Sparrows Point plant of Bethlehem Steel Co. for four 18x80-ft. triple-zone continuous slab-heating furnaces. (Presented at A.I.S.E. Annual Spring Conference, Philadelphia, May 26, 1947.)

13-64. Method for the Preparation of Butt-Welded Thermocouples Using 3-Mil Diameter Wire. E. F. Hammel. *U. S. Atomic Energy Commission MDDC 776; LADC 393,* April 3, 1947, 6 p.

Apparatus and procedures.

13-65. Stralingspyrometrie (Radiation Pyrometry). H. C. den Daas and F. Van Wijk. *Metalen,* v. 2, Oct. 1947, p. 21-24.

Methods used in optical and radiation pyrometry. The fundamental principles of heat-radiation. Two-color methods of optical pyrometry. (To be continued.)

13-66. Instruments. R. C. Baker. *Iron and Steel,* v. 20, Nov. 20, 1947, p. 562-565.

Previously abstracted from *Journal of the Iron and Steel Institute.* See item 13-48.

13-67. Temperature Measurement by Means of an Immersion Pyrometer. E. Hunter, A. R. Parkes, and J. W. Dews. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. B75-B81.

Previously annotated in R.M.L., v. 3, 1946.

SECTION XIV

FOUNDRY PRACTICE

14-1. Foundry Practice in Argentina. Eugene J. Ash. *Foundry,* v. 75, Jan. 1947, p. 72-73. 182-183, 186-187.

Impetus given by the war to foundry production; history of foundries in Argentina; quality; primitive methods; lack of sand control; availability of raw materials; attempts at mechanization.

14-2. Synthetic Sand in the Nonferrous Foundry. Stanley W. Brinson. *Foundry,* v 75, Jan. 1947, p. 80-84, 233-234.

Purchase inspection and tests, core sand mixes, and routine control devices used in the nonferrous foundry of the Norfolk Naval Shipyards.

14-3. Pilot Foundry Aids Product Development. G. W. Birdsall. *Foundry,* v. 75, Jan. 1947, p. 90-91, 234-235.

Reynolds Metals Co.'s experimental aluminum foundry.

14-4. Formulas for Determining the Weights of Castings. (Continued.) *Foundry,* v. 75, Jan. 1947, p. 121-122.

Formulas for pyramid with hexagonal base, frustrum of a hexagonal pyramid, sector of a spherical segment of one and two bases, ring made by cutting a cylindrical hole through a sphere, and ring of triangular cross-section tables for quick solution.

14-5. The Pattern Shop and Our National Economy. Arthur J. Tuscany. *Foundry,* v. 75, Jan. 1947, p. 79, 216, 218, 220, 222, 224.

Benefits to be derived from cooperative effort in industry, with special reference to patternmakers.

14-6. Casting Aluminum Billets for Extruding. R. W. Graham. *Iron Age,* v. 158, Dec. 26, 1946, p. 52-54.

Melting and casting of aluminum billets to meet the exacting demands of extruding operations. Use of book-type molds and the direct chill process.

14-7. New Binders Improve Core Performance. H. L. Gebhardt. *Iron Age,* v. 158, Dec. 26, 1946, p. 66-68.

Practical advantages accruing from the use of synthetic resin core sand binders. Among the characteristics imparted to cores by the recently perfected binders are faster baking; lower baking temperatures; faster collapsing; favorable tensile and compression strength; hard, dense surfaces and softer centers; and moisture resistance in the cured condition. Behavior of these binders under dielectric heat.

14-8. New Methods of Melting in the Cupola. V. M. Andreyeff. *Engineers' Digest,* v. 3, Nov. 1946, p. 576.

Modified cast iron can be obtained only by superheating of the molten metal, which may be done by stimulating the formation of CO_2 rather than CO in the cupola. Best results have been obtained by adding a few more rows of tuyeres, properly spaced. An improved recuperator is also discussed. (Condensed from 3rd Technical-Scientific Conference of the Kalinin Polytechnic Institute, Leningrad, Sept. 1944, p. 73-75.)

14-9. Cupola Stock Height. *Gray Iron Progress,* v. 3, Dec. 1946, p. 2-3.

"Stock height" is the distance from the top of the tuyeres to the top of the charges in the stack. Results of a series of tests made to determine the effects of variations.

14-10. Large Coke Vs. Small Coke. *Gray Iron Progress,* v. 3, Dec. 1946, p. 3-4.

Three sizes of coke were evaluated in cupola operation at Buflovak Equipment Division of Blaw-Knox. No great changes were noticed in the size range used (2x5 to 5x9 in.), although there were differences in percent of carbon dioxide in stack gas and in blast pressure, which may be important to foundries using centrifugal blowers.

14-11. Cupola Stack Gases. *Gray Iron Progress,* v. 3, Dec. 1946, p. 4-6.

Economic value of stack gas Co_2 control. Chart shows relation between CO_2 content, CO content, and heating

value per pound of carbon. In tests on sized coke, 2x5-in. coke produces 10.6% CO_2 in the stack as compared to 12.2% when 5x9-in. coke was burned. Thermal output from the small coke was only 92.5% of that from the large.

14-12. What Does It Cost? *Gray Iron Progress,* v. 3, Dec. 1946, p. 6-8.

The costs of refractory burn-out in cupola operation. Considers less obvious factors than the cost of the refractory material, such as the coke required to fill the space left by the burn-out, the amount of limestone used to flux the lining, the amount of heat required, and the labor to haul away the slag. Suggestions for minimizing the losses.

14-13. All-Scrap Mixes. *Gray Iron Progress,* v. 3, Dec. 1946, p. 8-9.

Some of the problems encountered in using all-scrap mixes in the foundry and how to combat them.

14-14. Some Examples of Quality and Quantity Production of Iron Castings. F. Andrew. *Foundry Trade Journal,* v. 80, Nov. 21, 1946, p. 283-288.

Methods adopted in the production of large quantities of good quality castings at Ferranti, Ltd., with particular emphasis on mechanization and improvements in patternmaking. (Paper read before the Lancashire branch of the Institute of British Foundrymen.)

14-15. Malleable Foundry Industry. J. R. Roxburg. *Foundry Trade Journal,* v. 80, Nov. 21, 1946, p. 289-291.

Current practice and chief postwar problems. (Presidential address to East Midlands branch of the Institute of British Foundrymen.)

14-16. Opkoling in den Koepeloven. (Carburization in a Cupola Furnace.) H. S. H. Ritzen. *Metalen,* v. 1, Nov. 1946, p. 45-49.

Factors influencing carburization in a cupola. The time of contact of the molten iron and coke may be regulated very simply. In a cupola with a high coke bed, such regulation is also possible within certain limits.

14-17. Precision Cast Finned Cylinders. E. I. Valyi. *Materials & Methods,* v. 24, Dec. 1946, p. 1450-1451.

By means of refractory mold casting, the A. R. D. Corp. has produced, first in its laboratory, then commercially, at the plant of its licensee, the Midwest Foundry Co., a finned, hollow cylinder with fins 0.030 in. thick projecting from a cylinder wall which is 0.15 in. thick.

14-18. Patterns Made From Cast Plastics. C. R. Simmons. *Materials & Methods,* v. 24, Dec. 1946, p. 1466-1468.

Use of Durez casting resin for foundry patterns. Advantages include initial cost, ease of casting and inexpensive finishing.

14-19. Formation de Criques Successives a Chaud dans un Tube en Acier Centrifugé. (Formation of a Series of Cracks in Steel Tubes Produced by Centrifugal Casting.) J. Caillaud. *Comptes Rendus,* v. 223, Nov. 4, 1946, p. 729-731.

Defects may be caused by the quality of sand used for molds, by the type of steel used for high-temperature casting (low deformability), and by the conditions of centrifuging (excessive speed of rotation.)

14-20. Some Factors to Consider When Purchasing Core Sand. H. Louette, A. E. Murton, and H. H. Fairfield. *Canadian Metals & Metallurgical Industries,* v. 9, Dec. 1946, p. 20-23.

Specifying grain size only in purchasing core sand is not a sufficient precaution to insure that suitable sand will be obtained. The pronounced effect of grain shape upon many of the properties of core sand mixtures. Rounded sand grain has many advantages over the angular shaped grain; these include lower core oil consumption, easier coremaking operations and less gas and smoke in the foundry.

14-21. Influence of Design and Patternmaking on Foundry Technique. T. H. Sneddon. *Foundry Trade Journal,* v. 80, Dec. 12, 1946, p. 365-369.

Construction of a cheap pattern and also the design and construction of a first-class pattern for use in a repetitive or semirepetitive foundry. (Paper read before the Scottish branch of the Institute of British Foundrymen. To be continued.)

14-22. Centrifugal Casting of Aluminum for Squirrel-Cage Rotors. Albert R. Hemstreet. *Electrical Manufacturing,* v. 39, Jan. 1947, p. 100-101.

To speed up rates of production using advantages of solid aluminum conductor structure, an air-operated centrifugal casting machine has been developed, capable of completing a casting cycle in 15 sec.

14-23. Foundry Control. W. A. Baker. *Metal Industry,* v. 69, Dec. 20, 1946, p. 505-507.

The various operations involved in the production of a casting, from the drawing board to the finished article, together with their priorities in the scheme of control. (Based on a paper presented before the Manchester Metallurgical Society. To be concluded.)

14-24. Die Casting. *Metal Industry,* v. 69, Dec. 20, 1946, p. 507.

Methods employed by German tech-

nicians reported after visit to eight German firms all engaged in the light alloy die-casting industry.

14-25. Experiments With a Foundry Test for the Fluidity of Molten Steel. L. W. Sanders and C. H. Kain. *Foundry Trade Journal,* v. 80, Dec. 5, 1946, p. 339-343.

A practical testpiece suitable for use in the foundry. Results indicate that consistently reproducible results may be obtained within narrow limits.

14-26. Some Problems in Cast Iron. Eugene Piwowarsky. *Iron Age,* v. 159, Jan. 9, 1947, p. 58-60.

Results of some wartime investigations covering hot blast cupolas, special melting units, rolled cast iron, heat and scale resistant and armored iron.

14-27. Semicontinuous Casting. *Metal Industry,* v. 69, Dec. 20, 1946, p. 515-516.

Plants in the Ruhr engaged in the production of wrought light alloys made great use of semicontinuous casting processes, one of the plants visited using a patented method known as the "sliding face mold". Many advantages are claimed for this method including those of almost complete prevention of oxidation, low internal stresses, good surface finish, very fine grain structure and a good sheet from ingot ratio. (Abstracted from report by the British Intelligence Objectives Sub-Committee.)

14-28. Selection of Alloys in the New Jack & Heintz Engines. *Die Castings,* v. 5, Jan. 1947, p. 18-20, 37-43.

Information on the selection of alloys, design factors, die castings practice, mechanical function, and performance characteristics.

14-29. Foundry Control. (Concluded.) W. A. Baker. *Metal Industry,* v. 69, Dec. 27, 1946, p. 530-532.

Control of metal composition and condition through study of casting process and also observation of it in operation with rectification where necessary.

14-30. Knock-Off Risers. S. W. Brinson and J. A. Duma. *Metal Industry,* v. 69, Dec. 27, 1946, p. 533-534.

Application of risers which, without any apparent impairment of feeding efficiency or metal quality, fall off the castings in the shakeout or are flogged off with one blow of a hand sledge. (Paper presented to A.F.A.)

14-31. Semicontinuous Casting. H. Hocking. *Metal Industry,* v. 70, Jan. 3, 1947, p. 13.

Developments for increasing output in the light alloy foundry. Latest designs of casting machines. Machining the cast billets.

14-32. Influence of Design and Patternmaking on Foundry Technique. (Continued.) T. H. Sneddon. *Foundry Trade Journal,* v. 80, Dec. 19, 1946, p. 393-396.

Deals with jobbing, semirepetitive and repetitive work in a steel foundry producing light castings, weighing from 1 to 70 lb. Redesigning of hand molding patterns.

14-33. Drying of Foundry Sand Cores by Dielectric Heat. J. R. Calhoun, L. E. Clark and H. K. Salzberg. *Foundry Trade Journal,* v. 80, Dec. 19, 1946, p. 405-406, 410.

Results of experiments show modern method of drying materials of high dielectric strength by placing them in a high-frequency electric field can be applied to foundry sand cores. (From an article published in *Industrial Ovens.*)

14-34. Recent Developments in Cast Iron Research. Harold Hartley. *Engineering,* v. 162, Dec. 20, 1946, p. 595-596.

British Cast Iron Research Association has developed a method for production of an improved cast iron having a nodular graphite structure. Tensile strength, elongation, shock resistance, and Brinell hardness were greatly improved. The material is said to possess the properties of present "high-duty" cast irons although special compositions or treatments are not required. The method is not described.

14-35. Unsoundness in Cast Light Alloys. Part I. *American Foundryman,* v. 11, Jan. 1947, p. 24-40.

Deals mainly with unsoundness which arises from the gas evolved from the melt when it solidifies, or from the combined effects of both. Discussion confined to castings produced by either the sand-cast method or permanent-mold method, but not by the die-cast method.

14-36. Gypsum Cement—Practical Patternmaking Applications. E. H. Schleede. *American Foundryman,* v. 11, Jan. 1947, p 46-50.

Applications to patternmaking include checking of core box by "booking" method; correcting a pattern for metal shrinkage. Data about gypsum cement to aid patternmaker in further applications.

14-37. Molding Sand. Brass and Bronze. L B. Osborn. *American Foundryman,* v. 11, Jan. 1947, p. 53-57; discussion, p. 57-58.

Nonferrous foundry sand problems. Properties of natural and synthetic sands and the requirements for different types of castings.

14-38. The Liquefaction and Solidification of Die-Casting Alloys. L. J. Goutier. *Machinery (London),* v. 69, Dec. 26, 1946, p. 830-833.

Way in which the technique used in

die casting of alloys should be controlled by utilization of the equilibrium melting point diagrams for the various alloy systems.

14-39. Control in a Mechanized Jobbing Steel Foundry. D. Brown. *Foundry Trade Journal,* v. 80, Dec. 26, 1946, p. 421-426, 430.

Some of the problems encountered in a jobbing foundry which handles lots of 50 to 1000 pieces on each order, and methods used to solve these problems.

14-40. Influence of Design and Patternmaking on Foundry Technique. (Continued.) T. H. Sneddon. *Foundry Trade Journal,* v. 80, Dec. 26, 1946, p. 427-429.

"V" cutter castings; "roller" casting; manganese steel castings; contraction allowances.

14-41. The Year's Progress in the Production and Application of Alloy Cast Irons. A. E. McRae Smith. *Metallurgia,* v 35, Dec, 1946, p. 93-96.

The year has been one of consolidation of the results of past experience, particularly experience gained during the war years when many foundries obtained first class melting plant and sound technical advice. Wider use of ladle additions has resulted in some progress in the production of alloy cast irons of varying composition and physical properties from a single base mixture.

14-42. An Engineer Looks at Sand Problems. Earl E. Woodliff. *Foundry,* v. 75, Feb. 1947, p. 66-67, 182, 184, 186, 188, 190.

Sand control, properties of various sands, core oils, binders, test procedures.

14-43. Producing Large Steel Castings. Pat Dwyer. *Foundry,* v. 75, Feb. 1947, p 74-77, 224, 226, 228.

One of a series describing various casting facilities of Bethlehem Steel Co. Equipment and technique.

14-44. Modern Improvements in the Chilled Car Wheel. L. H. Rudesill. *Foundry,* v. 75, Feb. 1947, p. 84-87, 170, 172, 175.

Recent improvements in the manufacturing process, especially those developed by Griffin Wheel Co. in cooperation with the Association of Manufacturers of Chilled Car Wheels, include scientific cupola and melting control; tellurium-graphite inoculating practice; chill control; metal temperature control; improved annealing practice; and improved design.

14-45. Formulas for Determining the Weights of Castings. (Continued.) *Foundry,* v. 75, Feb. 1947, p. 121-122.

Formulas and tables presented for weights of segment of an ellipsoid when base is parallel to the revolving axis; ring of elliptical cross section; solid generated by revolving a plane area about an axis; ring of circular cross section; sector of a paraboloid. (To be concluded.)

14-46. New Brass Foundry Makes Plumbing Fixtures. Walter Rudolph. *Foundry,* v 75, Feb. 1947, p. 128.

Equipment and technique at Hays Mfg. Co.'s new foundry at Albion, Pa.

14-47. Malleable Cast Iron. H. G. Hall. *Foundry Trade Journal,* v. 81, Jan. 16, 1947, p. 53-57.

Present state of knowledge concerning malleable cast iron and its structure and necessity for further research and development. (To be continued.)

14-48. A Permanent Mold Material. O. Smalley. *Steel,* v. 120, Feb. 3, 1947, p. 108, 158.

Advantage of Meehanite in providing consistent uniformity of metal structure.

14-49. Nonporous Bronze. E. R. Thews. *Metal Industry,* v. 70, Jan. 24, 1947, p. 65-67.

Gas absorption, reducing gases, "tin sweat", fluxes, melting and alloying, and 25 rules for melting and casting. (To be concluded.)

14-50. Formulas for Determination of the Coefficient of Friction of Molten Metal Flow. E. Z. Rabinowitch. *Reports of the Academy of Sciences of U.S.S.R.,* v. 54, Nov. 11, 1946, p. 395-397. (In Russian.)

Ruff's formulas are analyzed. Author believes that Ruff's method of generalization of empirical data results in an erroneous conception of this phenomenon.

14-51. Refractory Coatings for Permanent Molds. Harold E. Bourassa. *Iron Age,* v. 159, Feb. 6, 1947, p. 58-59.

Results of an investigation to determine the effectiveness of various types of coatings for permanent molds. Method of applying coatings.

14-52. Side-Blow Converter at Harrison. *Gray Iron Progress,* v. 4, Feb. 1947, p. 3-4

Operation of converter at Harrison, N. J., works of Worthington Pump and Machinery Corp.

14-53. Operation Data at Harrison. *Gray Iron Progress,* v. 4, Feb. 1947, p. 7-9.

Foundry practice at Harrison, N. J., works of Worthington Pump and Machinery Corp., including several of the sand mixtures used.

14-54. Nonporous Bronze. (Concluded.) E R. Thews. *Metal Industry,* v. 70, Jan. 31, 1947, p. 89-90.

Special fluxes; air pressure; phosphorus-copper; melting and casting rules; crucible melting; sand.

14-55. Some Practical Aspects of Bronze Founding. F. C. Evans. *Proceedings of*

the Institute of British Foundrymen, v. 38, 1944-1945, p. B114-B121.
Classification of bronzes; melting; molding sands; core sands; molding technique for tin.

14-56. A Survey of the Principles of Light Alloy Foundry Technology. M. R. Hinchcliffe. *Proceedings of the Institute of British Foundrymen*, v. 38, 1944-1945, p B122-B133.
Physical and chemical characteristics; melting and molding of aluminum and magnesium alloys; casting techniques.

14-57. How Baltimore Foundry Reclaims Shakeout Sand. *Link-Belt News*, v. 14, Feb. 1947, p. 1, 5.
Mechanical sand preparation and conveying system used by small foundry.

14-58. Vacuum Casting Reduces Scrap Loss. *Production Engineering & Management*, v. 19, Feb. 1947, p. 77.
Counter-gravity vacuum casting (a process developed by the Armour Research Foundation) which has reduced the average amount of rejects to 1 to 2% in recent test runs aggregating several thousand castings, as compared with the usual average of 5 to 10% rejects when using conventional pouring methods.

14-59. The Manufacture of Precision Castings. G. Vennerholm and E. Ensign. *Society of Automotive Engineers Preprint*, 1947, 9 p.
Various methods, with particular emphasis on investment molding. Their applications and limitations.

14-60. Precision Comes to the Foundry. *Machinery (London)*, v. 70, Jan. 30, 1947, p 147-148.
Development of improved zinc alloys and structural applications of die castings.

14-61. Malleable Cast Iron. (Concluded.) H. G. Hall. *Foundry Trade Journal*, v. 81, Jan. 30, 1947, p. 99-104.
Malleable iron theory and practice. Cooling through the critical range; gas annealing; effects of certain elements on graphitization rate; residual elements. Two unusual processes whereby malleable cast iron of superior properties may be produced.

14-62. The Centrifugal Casting of Brass (63:37) Ingots for Subsequent Cold Rolling. T. B. Crow. *Metallurgia*, v. 35, Jan. 1947, p. 141-146.
Experimental investigation carried out with a full-sized specially-constructed production unit into the possibility of casting brass (63:37) ingots for subsequent cold rolling into finished strip. Objects of the research; description of the plant; casting process; examination of the castings; machining the castings; rolling the castings; tests on finished strip; the future.

14-63. Production of Magnesium Sand Castings. G. B. Partridge. *Metallurgia*, v 35, Jan. 1947, p. 147-152.
In designing a modern magnesium foundry sections are partitioned off to effect good working conditions and also to facilitate production. Methods applied; preparation of molding sand for magnesium alloy castings; preparation of molds; use of chills; ingates, runners and risers.

14-64. German Production of Spun Pipe. M. M. Hallett. *Foundry Trade Journal*, v 81, Feb. 6, 1947, p. 136-138.
Practice at Gelsenkirchen, Wetzlar and Brebach-Saar. (Extracted from B.I.O.S. Final Report No. 700, "The German Centrifugal Castings Industry," by permission of the Controller of H.M. Stationery Office.)

14-65. Density Measurements. W. T. Pell-Walpole. *Metal Industry*, v. 70, Feb. 14, 1947, p. 123-125.
Usefulness of measurement of density as a routine control method, particularly for the control of batches of bronze castings of the same size, form and composition.

14-66. Efficient Salvage of Porous Castings. H. W. E. Riley. *Modern Metals*, v 3, Feb. 1947, p. 20-21.
Method which utilizes synthetics to produce a sealant which is practical and acceptable for most types of pressure-tight casting requirements.

14-67. What Kind of Pattern? *Foundry*, v 75, March 1947, p. 70-71.
First of three articles describing the type of pattern equipment recommended for use in producing various quantities of different size castings—patterns for castings whose largest dimension is less than 24 in.

14-68. Modern Melting Methods for Malleable Foundries. W. R. Jaeschke. *Foundry*, v. 75, March 1947, p. 72-75, 202-204, 206, 208, 212, 214, 216.
Duplexing operations, slag removal by sluicing with water, pulverized-coal firing, air preheating, sand-bed preparation.

14-69. Ventilating Screens, Breakers, Mullers. *Foundry*, v. 75, March 1947, p. 76-77, 229-231.
Equipment used in the continuous sand systems of mechanized foundries

14-70. Brass and Bronze Foundry Practice. D. Frank O'Connor. *Foundry*, v. 75, March 1947, p. 105, 172, 174, 176, 178, 180.
Practical methods in the production of brass and bronze castings are detailed in paper presented before the Chesapeake Chapter, American Foundrymen's Association.

14-71. Sands for Heavy Steel Castings. D. J. Taylor. *Foundry*, v. 75, March 1947, p 106-107, 129.

Factors influencing the selection of sands for heavy steel castings; spalling; properties and chemistry of silica sand; action of fluxes in production of high-temperature castings. (Presented at A.F.A. Regional Foundrymen's Conference, Philadelphia, Nov. 1946.)

14-72. New Lifting Device Simplifies Mold Weight Handling. William K. Mitchell. *Foundry*, v. 75, March 1947, p. 146, 148.

Compressed-air lifting device used for lifting weights from molds.

14-73. Formulas for Determining the Weights of Castings. (Continued.) *Foundry*, v. 75, March 1947, p. 151-152.

Tables and formulas for: sector of a ring of circular cross section; irregular castings which cannot be divided into elementary solids; hollow spherical wedge; sector of a ring made by cutting a cylindrical hole through the center of a sphere; segment of a ring of triangular cross section. (To be continued.)

14-74. 1947 Inventory of Foundry Equipment. *Foundry*, v. 75, March 1947, p. S1-S24.

Study of the distribution and age of foundry equipment is based on confidential reports from more than 1500 foundries throughout the United States and Canada. Contains the following sections: operating outlook; foundry capacity; modernization; melting furnaces; materials handling; sand equipment; other equipment; equipment buying.

14-75. Malleable Cast Iron. (Continued.) H. G. Hall. *Foundry Trade Journal*, v. 81, Jan 23, 1947, p. 75-79.

Fundamental discussion of theory and practice in casting of malleable iron. Extensive information concerning the structural changes which take place.

14-76. Fuel Economy and Melting. F. A. Allen. *Light Metals*, v. 10, Feb. 1947, p. 69-73.

Light metal melting equipment and a recently developed furnace.

14-77. Aluminum Foundry Sands and Binders. Hiram Brown. *Light Metal Age*, v. 5, Feb. 1947, p. 16-21.

Different types of sands, their origin, composition, size, and shape. Clay materials, their use and effect in sand mixes Functions and importance of water. Core binders and their good and bad features. Gas tests to determine how much and how rapidly gas is evolved from the various binders, and the importance of these results.

14-78. Unsoundness in Cast Light Alloys. Part II. *American Foundryman*, v. 11, Feb. 1947, p. 35-47.

Concluding installment of A.F.A. committee report covers effect of solidification rate and gas content; effect of grain size; effect of A.F.A. permeability and moisture content of the molding sand; and relation of pinhole porosity to microporosity. Many radiographs and micrographs.

14-79. Making Permanent Molds. Vincent J. Sedlon. *American Foundryman*, v. 11, Feb. 1947, p. 49-54.

An outline of the skills and facilities necessary for successful production of permanent molds for aluminum castings. Problems encountered.

14-80. Aluminum Hand Truck Cast in Permanent Mold. H. R. Noyes. *Iron Age*, v. 159 March 6, 1947, p. 72-73.

Some of the engineering problems involved and how they were solved.

14-81. La Fabrication des Pièces en Acier Moulé Destinees aux Constructions Aéronautiques. (Production of Steel Castings for Aircraft Construction.) R. Buquet. *Fonderie*, Dec. 1946, p. 397-415.

Applications, methods of casting, and final treatment in U.S.A., England, and Germany.

14-82. De Koepeloven. (The Cupola.) J. S. Abcouwer. *Metalen*, v. 1, Feb. 1947, p. 93-99.

Factors controlling iron smelting in a cupola. The importance of operational equilibrium conditions. The diagram recommended by Ralph Knight in 1926 for judging the coke bed is recommended. 49 ref.

14-83. Centrifugal Casting. L. Northcott. *Foundry Trade Journal*, v. 81, Feb. 13, 1947, p 151-155.

Machine design, German developments, metallurgical features, and mathematics of the process.

14-84. Mare Island's Accurate Method of Propeller Manufacture. Milton M. Metcalf. *Journal of the American Society of Naval Engineers*, v. 59, Feb. 1947, p. 33-42.

Techniques developed by the Navy for casting of giant manganese-bronze propellers. Illustrated.

14-85. Timer for Die-Casting Machine. Gerald Delong. *Electronics*, v. 20, March 1947, p. 110-111.

Accuracy and efficiency of die casting with aluminum and zinc are obtained by an electronic timer that determines the interval between the shot or molding action and the ejection of the casting from the mold.

14-86. The Manufacture of Precision Castings. Part II. G. Vennerholm and E. Ensign. *Tool & Die Journal*, v. 12, March 1947, p. 72-77, 132-135.

Investment molding and plaster molding methods.

14-87. Plate Performance as Affected by Die Casting Quality. E. A. Anderson. *Die Castings*, v. 5, March 1947, p. 56, 58.

Poor protection sometimes afforded by the plating material is often caused by defective castings. Micrographs.

14-88. Manufacture of Zinc-Base Alloy Die Castings. J. C. Fox. *Monthly Review,* v. 34, March 1947, p. 288-297.

Special high grade zinc; composition of zinc-base alloys; microstructure of zinc-aluminum alloys; casting practice; die-casting machines; dies; design features of zinc die castings; die steels.

14-89. Modern Foundry Equipment Produces Quality Castings. Arthur Q. Smith. *Industrial Gas,* v. 25, March 1947, p. 17, 32-33.

Procedures and equipment at Hampden Brass and Aluminum Co., Springfield, Mass., for production of nonferrous castings.

14-90. Theory and Practice of the Aluminum Sand Foundry. E. Raybould. *Foundry Trade Journal,* v. 81, March 6, 1947, p. 171-176.

A few simple examples of the wide range of work involved in a light alloy foundry, illustrating direct application of technical theory to practical foundry operations. Covers molding sands; core sands; the mold; use of chills; and metal conditions. (Paper read before the London branch of the Institute of British Foundrymen. To be continued.)

14-91. Magnesium Molding Sands. *Light Metals,* v. 10, March 1947, p. 120-123.

Magnesium casting technique. A new method of preparing synthetic molding sands.

14-92. Introduction a l'Etude des Défauts de Fonderie. (Introduction to the Study of Foundry Defects.) Francois Boussard. *Fonderie,* no. 12, 1946, p. 431-434.

Compilation of the International Dictionary of Foundry Defects, where these defects are classified by their aspect and their cause. Sixty-seven defects are listed.

14-93. L'Etat Actuel de la Centrifugation en Fonderie. (The Present State of Centrifugal Casting in the Foundry.) Jacques Boucher. *Fonderie,* no. 12, 1946, p. 435-437; discussion, p. 437.

The three general methods of centrifugal casting: pure centrifugation on a horizontal, vertical, or inclined axis; semicentrifugation on a vertical axis; and casting under centrifugal pressure on a vertical axis.

14-94. La Fabrication des Lingotières d'Aciéries. (Manufacture of Steel Ingot Molds.) Alphonse Charmeau. *Fonderie,* no. 12, 1946, p. 446-450; discussion, p. 450-452.

Examination of the qualities required in ingot molds by steelmakers and analysis of the necessary factors in their production; manufacture of ingot molds at a French foundry; research for improvement of service life.

14-95. Quelques Remarques Pratiques sur les Gaz dans l'Acier et la Fonte. (Some Practical Remarks on Gases in Steel and Cast Iron.) Eugene Eyt. *Fonderie,* no. 12, 1946, p. 438-439.

The influencing factors in foundry difficulties attributed to dissolved gases, viscosity, heat conductivity, and surface tension.

14-96. Internal Risers for Steel Castings. Turney Shute. *Canadian Metals & Metallurgical Industries,* v. 10, March 1947, p. 24, 41, 44, 49.

Where internal risers can be used and their advantages.

14-97. Producing Steel Castings Without Venting Molds. J. Richard Adams. *American Foundryman,* v. 11, March 1947, p. 26-29.

The pros and cons of venting. Author believes that venting is unnecessary and backs up his opinion by citing a number of examples. Savings of $6.00 to $10.00 per ton have resulted from elimination of venting in jolt-squeeze and slip-flask work.

14-98. Magnesium Alloys. Small Calcium Additions. Marvin E. Gantz. *American Foundryman,* v. 11, March 1947, p. 33-38.

Technique adopted by the American Magnesium Corp. for making calcium additions, and some of the advantages and disadvantages of using calcium.

14-99. Foundry Dust Control Systems. *American Foundryman,* v. 11, March 1947, p. 42-47.

Hoods and Piping, by E. A. Carsey and Maintenance, by Kenneth M. Smith.

14-100. Automotive Foundries Around Detroit. *Foundry,* v. 75, April 1947, p. 94-105.

Pictures show operations at a number of foundries.

14-101. Sand Control. George A. Zabel. *Foundry,* v. 75, April 1947, p. 110-112, 150, 152.

Methods used at Universal Foundry Co., Oshkosh, Wis.

14-102. Pressure Casting Matchplates. Edwin Bremer. *Foundry,* v. 75, April 1947, p. 124-126, 284-286.

Techniques used at Ebaloy, Inc., Rockford, Ill., in the casting of nonferrous alloys using compositions of gypsum cement or plaster of paris.

14-103. Theory and Practice of the Aluminum Sand Foundry. Part II. E. Raybould. *Foundry Trade Journal,* v. 81, March 13, 1947, p. 197-202; discussion, March 20, 1947, p. 223-225.

Design influence; choice of alloy; influence of alloy composition; gas porosity. (Paper read before the Lon-

don branch of the Institute of British Foundrymen.)

14-104. Utilization of High Sulphur Coke in Foundry Practice. *Foundry Trade Journal*, v. 81, March 20, 1947, p 217-219.

The steps which may be taken to overcome the deleterious effect of a high sulphur content on the metal. Methods of minimizing the pick-up of sulphur during cupola melting, and desulphurization of molten metal.

14-105. Defective Castings. "Shedrick". *Iron and Steel*, v. 20, March 1947, p. 88, 107.

Their cause and cure.

14-106. Foundry Waste. A. J. Edgar. *Iron and Steel*, v. 20, March 1947, p. 97-100.

Need of accuracy in weighing; an efficient heat transfer process; proper coke bed height; control of cupola operations; elimination of loss of cores due to mistakes in coremaking and core assembly; regulation of casting temperature to prevent waste.

14-107. Copper Tuyères. *Iron and Steel*, v. 20, March 1947, p. 105-107.

Method adopted in Germany employing the centrifugal casting process, using vertical centrifugal machines and electrolytic copper as the material. A method of rolling tuyères from cast blanks.

14-108. Foundry Sand Produced Near Eugene, Oregon. W. D. Lowry. *Mining Technology*, v. 11, March 1947, T. P. 2058, 10 p.

The properties and geology of the deposits, the washing plant, and the results of large-scale foundry tests.

14-109. Problems Ahead as Seen by Division and Committee Chairmen. *American Foundryman*, v. 11, April 1947, p. 76-81, 166.

Twelve brief articles outline some of the problems awaiting solution in foundry work.

14-110. Foundry Mechanization, Design-Operation. C. O. Bartlett. *American Foundryman*, v. 11, April 1947, p. 82-90.

The layouts of the equipment installed in gray iron foundries for mechanization.

14-111. Foundry Sand Laboratory. O. Jay Myers. *American Foundryman*, v. 11, April 1947, p. 117-122.

The organization of such a laboratory.

14-112. Aluminum Casting Alloy; Fluxes —Degasifiers—Grain Refiners. James D. Kline. *American Foundryman*, v. 11, April 1947, p. 123-124.

Metallic fluxes as deoxidizers; fluxing alloys as grain refiners; salt fluxes as melting covers.

14-113. Patterns for Production. John E. Gill. *American Foundryman*, v. 11, April 1947, p. 127-128.

The new methods being applied in foundry pattern design and making.

14-114. Molding Sand Binders. L. Jenicek. *American Foundryman*, v. 11, April 1947, p. 132-140.

Czechoslovakian author describes his own experimental results and experiences and quotes those of other investigators, the purpose being to inform the American foundryman concerning the trends of European investigations during the wartime period. 19 ref.

14-115. Requirements for Setting Up a Precision Investment Casting Plant. Alexander Saunders. *Iron Age*, v. 159, April 10, 1947, p. 70-74.

The process in general with some of the newer equipment developed specifically for the process; the labor and capital requirements for setting up a casting plant.

14-116. Foundry Ventilation. Jim Black and Lester T. Avery. *Heating, Piping & Air Conditioning*, v. 19, April 1947, p. 78-81.

The exhaust systems for one molding line in a mechanized gray iron foundry having seven molding lines, two open floor areas, four cupolas, and an electric furnace.

14-117. Vacuum Melting and Casting. Allen G. Gray. *Steel*, v. 120, April 14, 1947, p. 86-88, 132, 136, 139, 140, 142, 144.

General principles, status, and future possibilities of technique as practiced here and abroad.

14-118. De Koepeloven. (Cupola Furnaces.) J. S. Abcouwer. *Metalen*, v. 1, March 1947, p. 118-122.

Chemical process in cupola furnaces and factors involved. Optimum conditions for smelting based on experimental data.

14-119. Production of Magnesium Sand Castings. G. B. Partridge. *Metallurgia*, v. 35, March 1947, p. 241-245.

Technique involved in melting of magnesium alloys. The types of fluxes used; the melting units, with special reference to melting pots; preparation of the metal for casting, including superheating, grain refinement and the gas effect.

14-120. Patternmaking. A New Machine for Cutting Irregular Shapes. B. Levy. *Foundry Trade Journal*, v. 81, March 27, 1947, p. 239-244.

Economical machining and easier production of patterns particularly for irregular-shaped work.

14-121. Foundry Practice. H. W. Lownie, Jr. *Metals Review*, v. 20, April 1947, p. 5-8.

Developments during the past year as described in the literature. Core and sand binders; dielectric heating; research; improved working conditions

and mechanization; improved riser techniques; solidification of metals; precision castings; cast phenolic resins for patterns.

14-122. Equipment and Products for the Foundry Industry. *Metals Review*, v. 20, April 1947, p. 9-11, 14-15, 17.

The more important innovations offered commercially during 1946. Feeding compounds; furnaces; refractories; centrifugal casting; precision casting; shakeouts; coremaking equipment; sand preparation; molding equipment; dust control.

14-123. Aluminum Fluxing and Melting Practice. *Modern Metals*, v. 3, April 1947, p. 18-23.

The various fluxing methods for molten aluminum, permanent-mold and die-casting melting practice, metal charging, and furnace operations.

14-124. Core Binders and Baking. Part II. *Light Metal Age*, v. 5, April 1947, p. 12-15, 32.

Properties of the oils used in wet binders, dry binders, and miscellaneous binders. Techniques of core-sand mixing and core baking.

14-125. How the Ford Rouge Foundry Handles Hot Metal for Continuous Pouring. W. G. Patton. *Iron Age*, v. 159, April 24, 1947, p. 40-43.

The flow of the molten metal from the blast furnace and cupola, through the mixers, electric furnaces, and air furnace to the mold to provide a continuous supply of metal, closely controlled as to composition and temperature, for pouring up to 6000 blocks in 16 hr.

14-126. Centrifugal Casting Copper-Spun Rotors. G A. Anderson. *Steel*, v. 120, April 28, 1947, p. 96-97, 126, 129.

Procedure followed by Fairbanks, Morse & Co. to prepare steel rotor and stator laminations for the casting operation. Casting technique.

14-127. Adopts Chemically Coated Molding Sand. William G. Gude. *Foundry*, v. 75, May 1947, p. 66-71.

The first foundry to make commercial use of chemically coated molding sand, Lynchburg Foundry Co., reports important benefits in operating practice and lower costs resulting from this new process.

14-128. Making a 232-Ton Steel Casting. *Foundry*, v. 75, May 1947, p. 78-79.

How largest and heaviest casting was made for the frame of a 6000-ton capacity, high-speed mechanical forging press by United Engineering & Foundry Co.

14-129. Unsoundness Caused by Gases in Copper-Base Alloys. L. W. Eastwood and J. G. Kura. *Foundry*, v. 75, May 1947, p. 80-82, 200, 202, 204, 206, 208.

First of a series based on investigations at Battelle Memorial Institute sponsored by the Non-Ferrous Ingot Metal Institute. Various types of unsoundness encountered and their causes. Problems requiring solution.

14-130. What Kind of Patterns? (Concluded.) *Foundry*, v. 75, May 1947, p. 86-89.

The proper selection of pattern equipment for production of castings in long production runs.

14-131. Pours Engine Castings in Dry Sand Molds. Pat Dwyer. *Foundry*, v. 75, May 1947, p. 90-93, 112.

Foundry facilities and practices of the Chicago Pneumatic Tool Co. at Franklin, Pa. General features. (To be concluded.)

14-132. Wisconsin Conference. Technical Discussion. Edwin Bremer, William G. Gude, Erle F. Ross, and George A. Pope. *Foundry*, v. 75, May 1947, p. 130, 132, 135, 143.

Reports on technical papers presented at the tenth annual Regional Foundry Conference of the Wisconsin Chapters, A.F.A., and the University of Wisconsin.

14-133. Formulas for Determining the Weights of Castings. (Concluded.) *Foundry*, v. 75, May 1947, p. 139.

Weights of spherical segments of one and of two bases; weights of sand bodies from dimensions; weight of a spoked fly wheel; finding the center of gravity of irregular figures.

14-134. Modified Melting Practice Improves Bronze Pressure Castings. S. W. Wysocki. *Iron Age*, v. 159, May 1, 1947, p 47-49.

Improved structure and properties of bronze pressure castings resulting from the use of a cover compound and a degasifier in addition to the usual deoxidizer. A series of tests was run to determine the optimum amounts of cover compound and degasifier required to obtain the most beneficial effects. Cost of the additions and melting procedures used.

14-135. Mechanized Melting Methods for Foundries. A. W. Gregg. *Iron Age*, v. 159, May 8, 1947, p. 60-65.

The latest developments in methods and equipment for the mechanization of ferrous and nonferrous melting and the advantages and disadvantages of various types of equipment. How mechanized melting procedures not only reduce operating costs but also improve the quality of the metal.

14-136. A.F.A. Annual Meeting. *Iron Age*, v. 159, May 8, 1947, p. 80-86.

Operating problems and new techniques.

14-137. The Production of Cast Crankshafts. R. B. Templeton. *Institution of Automobile Engineers Journal*, v. 15, March-April 1947, p. 231-249.

Production and design of cast automotive crankshafts. Properties of available materials, dimensional tolerances, comparative production times for steel and cast iron crankshafts, heat treatment, and foundry techniques.

14-138. A Survey of Precision Casting. J. N. Read. *Metallurgia*, v. 35, April 1947, p. 275-278.

Foundry technique of the various precision processes, working limits, and progress difficulties. A survey of present-day production and expected applications.

14-139. The Manufacture of Magnesium Sand Castings. G. B. Partridge. *Metallurgia*, v. 35, April 1947, p. 279-284.

Following cleaning and before being dispatched, magnesium castings are given a very thorough inspection which embraces examination for surface flaws and cracks, dimensional checking, X-ray inspection by radiography, and metallographic examination for grain size and heat treatment efficiency. A fracture test is carried out on a percentage of castings produced in special cases, when called for by the customer.

14-140. Some Jobbing Foundry Methods. Tubal Cain. *Iron and Steel*, v. 20, April 1947, p. 128.

Use of the old casting as a pattern.

14-141. Cast Iron and Steel. (Continued.) Ernest C. Pigott. *Iron and Steel*, v. 20, April 1947, p. 133-135.

Influence and commercial applications of manganese and molybdenum. (To be continued.)

14-142. Improvements in Hollow Sticks and Billets by Casting Onto Metal Cores. W. T. Pell-Walpole. *Foundry Trade Journal*, v. 81, April 10, 1947, p. 285-293.

Experience of the Tin Research Institute in studying the problems of using chill cores with the object of applying degassing and slow pouring techniques developed for chill-cast bronze to improve the quality of cored sticks and billets.

14-143. Making a Light Alloy Snap Flask. J. A. McIntosh. *Foundry Trade Journal*, v. 81, April 17, 1947, p. 313.

Cope-pattern and drag-pattern construction. Molding method employed.

14-144. Die Casting in Aluminum Bronze. *Machinery (London)*, v. 70, April 24, 1947, p. 437.

Method gives a reasonable measure of control on a material which is subject to wide variations when made from virgin metals.

14-145. Lightweight Gasoline Engines Made From Die Castings. R. P. McCulloch. *Iron Age*, v. 159, May 15, 1947, p. 52-56.

Factors influencing the choice of die castings in the design of a new type lightweight engine, including such considerations as a substantial reduction in machining operations, lower scrap losses, and the possibility of employing light, inexpensive machine tools, and greater flexibility for design changes. Major manufacturing and assembly operations in the production of McCulloch motors at a rate of 10,000 per month.

14-146. Advances in the Foundry Industry. Charles K. Donoho. *Metal Progress*, v. 51, May 1947, p. 765-770.

Wartime changes in foundry practice; how these changes will affect peacetime output, markets, and competitive uses.

14-147. New Molding Technique Improves Cast Crankshaft. *Automotive and Aviation Industries*, v. 96, May 15, 1947, p. 33.

New technique utilizes cooling capacity of the continuous conveyer hangers on which crankshafts are poured in groups of four. The hangers, serving as a base of vertical molds, promote the progressive cooling of the metal from the bottom up so that molten metal can fill in continually the space normally resulting from solidification and consequent shrinking.

14-148. First Aid to a Foundry Problem. *Inco*, v. 21, no. 2, 1947, p. 19, 26.

Use of monel chaplets (small metal pieces used to support cores for hollow castings).

14-149. Scientific Research and the Canadian Foundry Industry. H. H. Fairfield. *American Foundryman*, v. 11, May 1947, p. 53-55.

Results of a survey of Canadian foundrymen made to determine the most important subjects for research by the Canadian Bureau of Mines' newly established foundry research laboratory.

14-150. Gating Magnesium Alloy Castings. H. E. Elliott and J. G. Mezoff. *American Foundryman*, v. 11, May 1947, p. 71-79.

A new gating method by which some of the problems created by the chemical activity of liquid magnesium alloys have been overcome more economically than when using older gating methods.

14-151. Marketing Preparation of Foundry Sands. Franklin P. Goettman. *American Foundryman*, v. 11, May 1947, p. 80-82.

Important factors in the production of uniform washed sands at Albany, N. Y., and Southern, N. J.

14-152. Liquid Phenolic Resins for Casting Foundry Patterns. C. R. Simmons. *American Foundryman*, v. 11, May 1947, p. 94-96.

The processing and application of accelerated-type liquid phenolic casting resins. Basic uses include, in addition to foundry applications, forming dies for both hydropress and stretchpress operation, assembly jigs and fixtures, checking fixtures, design and working models, plating shields, masking fixtures, and patterns used in duplicating machines.

14-153. Solid and Slush-Type Zinc Alloy Permanent Mold Castings. Herbert Chase. *Iron Age*, v. 159, May 29, 1947, p. 58-63.

Procedure used to produce such castings for use in home floor lamps, covering particularly the making of the molds and pouring and slushing techniques. The economics of this type of casting vs. die casting.

14-154. Saving Foundry Coke. J. A. Bowers. *Foundry*, v. 75, June 1947, p. 72-73, 258-260.

Practical methods for reduction of coke consumption.

14-155. Cores, Sands, and Binders. O. Jay Myers. *Foundry*, v. 75, June 1947, p. 74-75, 192, 194, 196, 200.

Fundamental principles involved in production of satisfactory cores.

14-156. Casting Zinc Alloy Dies. S. Menton. *Foundry*, v. 75, June 1947, p. 76-79, 267-269.

Foundry practice followed by the industry in casting of the above for the making of steel stampings.

14-157. Importance and Future of the Foundry Industry. George T. Christopher. *Foundry*, v. 75, June 1947, p. 85, 160, 163.

The need for increased production of gray iron castings for the automobile industry, in spite of the insistence of foundrymen that they are now operating at capacity. The labor problem of the foundry due to working conditions.

14-158. Should Molds Be Vented? J. Richard Adams. *Foundry*, v. 75, June 1947, p. 86-87, 268-269.

Experience shows that venting is unnecessary.

14-159. Pours Engine Castings in Dry Sand Molds. (Concluded.) Pat Dwyer. *Foundry*, v. 75, June 1947, p. 88-91, 184, 188, 190, 192.

Foundry practice in the Franklin, Pa., plant of the Chicago Pneumatic Tool Co.

14-160. Kansas Manufacturer Builds Modern Gray Iron Foundry. *Iron Age*, v. 75, June 5, 1947, p. 92-93, 232, 234.

Equipment and procedures followed by McNally Pittsburg Foundries, Inc., Pittsburg, Kan.

14-161. Sealing Bronze Pressure Castings Through Heat Treatment. Fred L. Liddell. *Aluminium & the Non-Ferrous Review*, v. 12, Jan-March 1947, p. 2-4, 6.

An investigation of the possibility of sealing gun metal, valve-bronze, and hydraulic-bronze castings by heat treatment. Short-time pressure tests at room temperature indicated that sealing took place on annealing for 3 hr. at 1200 to 1300° F. in an air or oxygen-rich atmosphere. Further work under service conditions is necessary to justify the technique.

14-162. Relative Strengths of Core Binders. Part III. Hiram Brown. *Light Metal Age*, v. 5, May 1947, p. 11-13, 26.

A total of 17 binders of various classes were tested for their relative bonding power, rapidity of baking, and relative cost. Economic considerations. (To be continued.)

14-163. Basic Cupola Practice. Recent Progress and Prospects. Part I. *Foundry Trade Journal*, v. 82, May 1, 1947, p. 7-12.

Desulphurization and dephosphorization of cupola iron and pig iron, giving the results of cooperative work under the auspices of the Technical Council of the Institute of British Foundrymen.

14-164. Basic Cupola Practice. Recent Progress and Prospects. Part II. *Foundry Trade Journal*, v. 82, May 8, 1947, p. 27-32.

Desulphurization and dephosphorization of cupola iron and pig iron in basic-lined ladles. (Presented at meeting of Institute of British Foundrymen, March 19, 1947.)

14-165. Practical Elements of Machine Molding. F. J. Bullock. *Foundry Trade Journal*, v. 82, May 15, 1947, p. 45-49; discussion, p. 49-50.

Technique followed. Machine selection and power. Patterns. (Paper read before the South African branch of the Institute of British Foundrymen.)

14-166. Application of Hydro-Blast to Dressing and Sand Recovery. Part I. Wm. Y. Buchanan. *Foundry Trade Journal*, v. 82, May 22, 1947, p. 69-74.

Use of a wet sand-blast process for the dressing of castings. Description of the recovery of the sand. (Read before the Scottish Branch of the Institute of British Foundrymen, Royal Technical College, Glasgow. To be continued.)

14-167. The Cupola as a Precision Instrument. R. C. Tucker. *Foundry Trade Journal*, v. 82, May 22, 1947, p. 75-78; discussion, p. 78-79.

Factors which promote a high degree of uniformity in melting rate, metal temperature, and quality—design; raw materials; and operation.

14-168. Production of Magnesium Alloy Castings. G. B. Partridge. *Metallurgia*, v. 36, May 1947, p. 7-12.

Gravity and pressure die-casting technique.

14-169. Drawing and Forming Steel With Zinc Alloy Dies. Part III. S. Menton. *Steel,* v. 120, June 9, 1947, p. 80-81, 109, 112, 114, 117.

Foundry practice for casting Kirksite; production of open molds, sands and binders for molds and cores, pouring techniques, and protective measures against warpage.

14-170. Semicontinuous Casting. H. Hocking. *Metal Industry,* v. 70, May 9, 1947, p. 342.

Use of the semicontinuous casting machine to attain and maintain an improved quality material coupled with an increased rate of production.

14-171. Application of Hydro-Blast to Dressing and Sand Recovery. Part II. Wm. Y. Buchanan. *Foundry Trade Journal,* v. 82, May 29, 1947, p. 91-95; discussion, p. 96.

Test results using the Hydro-Blast process for preparation of foundry sands. (Paper read before the Scottish branch of the Institute of British Foundrymen, Royal Technical College, Glasgow.)

14-172. Core Operating Devices for Die Casting Dies. N. Field. *Machinery (London),* v. 70, May 29, 1947, p. 576-579.

Design details of mechanical devices for withdrawal of cores.

14-173. Dies for Radio Casing. *Machinery (London),* v. 70, May 29, 1947, p. 579.

Dies for part which is pressure cast in aluminum alloy.

14-174. Light-Alloy Castings. J. A. Oates. *Aircraft Production,* v. 9, June 1947, p. 218-223.

Production of aircraft pistons and other components by Wellworthy Piston Rings, Ltd., including casting and machining methods.

14-175. Cadillac's Modernized Foundry Facilities. Joseph Geschelin. *Automotive and Aviation Industries,* v. 96, June 15, 1947, p. 24-27, 72.

Is highly mechanized and provided with latest types of equipment.

14-176. How to Make Precision Castings. James Van Voast. *American Machinist,* v. 91, June 19, 1947, p. 125-140.

Design, production, and applications.

14-177. When Metal Atoms Wander. Edwin Laird Cady. *Scientific American,* July 1947, p. 15-17.

Use of heat and pressure in pressure casting and compression welding.

14-178. Electronic Core Baking. R. W. Crannell. *Foundry,* v. 75, July 1947, p. 66-69, 240-241.

Development work conducted at Lehigh Foundries, Inc., during the past year.

14-179. A Study of the Behavior of Molding Sand When in Contact With Liquid Steel. J. B. Caine. *Foundry,* v. 75, July 1947, p. 72-77, 143, 146, 149, 153, 155-156, 158.

Simple procedure used for an extensive investigation of the effects of various factors on the above. Over 5000 tests were made. The effects of ramming procedure, air drying, water content, new sand vs. reclaimed sand, green sand vs. air-dried sand, and of various organic binders.

14-180. New Automotive Foundry Engineered on Assembly Line Pattern. *Foundry,* v. 75, July 1947, p. 80-85, 240.

Procedures in Cadillac's new foundry.

14-181. Plastic Patterns. Robert H. Herrmann. *Foundry,* v. 75, July 1947, p. 89, 232-233.

Advantages and techniques for use of plastic patterns of phenol-formaldehyde resin.

14-182. A.F.A. Sessions Detail Casting Developments. *Foundry,* v. 75, July 1947, p 96-97, 122, 125-126, 128.

Concludes report on the technical papers and discussions at the recent annual meting of A.F.A. in Detroit.

14-183. High Production of Carburetor Die Castings. Herbert Chase. *Machinery,* v. 53, July 1947, p. 158-163.

Die casting, chromate treating, and machining operations performed in producing 2600 zinc alloy carburetors a day. (To be continued.)

14-184. Foundry Grinding Wheels. Carl A. Carlson. *American Foundryman,* v. 11, June 1947, p. 22-27.

Their manufacture and use.

14-185. Molding Sands. G. R. Gardner. *American Foundryman,* v. 11, June 1947, p. 34-38.

Method for accumulating data useful in defining the range of values over which mold properties may extend.

14-186. New Process Chemically Treats Molding Sand. Thomas W. Curry. *American Foundryman,* v. 11, June 1947, p 50-56.

Initial operation consists of coating the sand grain with a micro-thin film of a high carbon resin. This is accomplished by mixing a washed and damp silica sand with a proportionate amount of the water-soluble chemical in the ordinary foundry mixer. The mixture is then passed through a rotary drier at 300 to 350° F., to evaporate the solvent and water vapor and set the coating on the grain. The coated sand in then introduced to the molding unit, where it is subsequently mixed with bentonite, cereal, the water-soluble chemical, and water.

14-187. Gates and Risers. Nathan Janco. *American Foundryman,* v. 11, June 1947, p. 57-60.
Details of the calculation of sizes for centrifugal casting.

14-188. Cupola Operation. Walter Chretien-Herand. *Iron and Steel,* v. 20, June 1947, p. 306.
Swiss foundry manager presents empirical calculations for determining amounts of Si, P, S, and Mn upon repeated remelting. Factors affecting carbon content upon remelting.

14-189. Spark Arresters. J. H. List. *Iron and Steel,* v. 20, June 1947, p. 314.
Interesting new design for two-cupola operation.

14-190. Gases Given Off by Core Binders. Hiram Brown. *Light Metal Age,* v. 5, June 1947, p. 10-13.
Experimental data for 17 core oils with linseed oil, mineral oil, urea resin and cereal flour as bases. Also gives ratio of strength to gas content of binders.

14-191. Progress in Casting. A Review of American Foundry Practice. *Metallurgia,* v. 36, June 1947, p. 97-99.
Papers by six experts from Battelle Memorial Institute dealing with developments in gray iron, malleable iron, steel, brass and bronze, aluminum, and magnesium castings, are briefly reviewed. (The papers were originally published in *Foundry,* v. 74, no. 1, 1946, p. 70-103.)

14-192. Some Molding Problems and Their Solutions. S. Jane. *Foundry Trade Journal,* v. 82, June 5, 1947, p. 113-115, 118.
How the following problems were solved: a frame 9 ft. square and curved on the base to fit a shell 13 ft. 6 in. in diameter; a truck wheel with lugs; and a complex part called a "tank spare." (From a paper read before the South African Branch of the Institute of British Foundrymen.)

14-193. German Spun Cylinder Liners. *Foundry Trade Journal,* v. 82, June 5, 1947, p. 119-120, 122.
Machine design; foundry technique; charging equipment; mold dressing; and sand practice. (Abstracted from B. I. O. S. Report No. 700.)

14-194. Considerations in the Purchase of Patterns. W. G. Schuller. *Foundry Trade Journal,* v. 82, June 5, 1947, p. 123-124.
Factors leading to cost reduction and a uniformly good product. (Paper presented to Annual Meeting of A.F.A.)

14-195. Centrifugal Casting. Jhan Van Hiel. *Western Machinery and Steel World,* v. 38, June 1947, p. 98-101.
Process, especially as conducted at the Torrance Brass Foundry, Torrance, Calif.

14-196. Again—East Comes West. *Western Machinery and Steel World,* v. 38, June 1947, p. 112-114.
Operations at Howard Foundry Co. in casting of ferrous and nonferrous metals.

14-197. Effect of Sand Properties Upon Castings. N. J. Dunbeck. *Canadian Metals & Metallurgical Industries,* v. 10, June 1947, p. 22-26, 35, 43.
The effect of molding materials other than sand. The effects of green strength, dry and hot strength, permeability, moisture content, flowability, mold hardness, deformation (toughness), expansion, refractory value and sintering point, collapsibility, and durability. Effect of additions of sea coal, pitch, cereal and resin binders, wood flour, fuel oil, silica flour, and iron oxide, to the sand for castings.

14-198. Cellulose Derivatives as Core Binders in German Foundries. O. R. J. Lee. *Foundry Trade Journal,* v. 82, June 12, 1947, p. 135-136.
Experimental results.

14-199. Additions to Metal Coreboxes. *Foundry Trade Journal,* v. 82, June 12, 1947, p. 145.
Design improvements.

14-200. Core and Molding Sands for Aluminum Foundries. C. E. Heussner, Donald M. Bigge, Harvey J. Cole, Gordon Curtis, Harry Dietert, Robt. E. Schenck, and Norman Smith. *Modern Metals,* v. 3, June 1947, p. 21-25.
Sixth of a series dealing with aluminum-foundry practice describes molding sands, binders, sand testing, reprocessing molding sands, core sands and binders, core washes and sprays, inhibitors, core baking, reclamation of core sand, and various definitions for foundry-sand terms.

14-201. The Lost-Wax Process. H. Evans, P. S. Cotton, and J. Thexton. *Machinery (London),* v. 70, June 19, 1947, p. 645-650.
Its application to the precision casting of nickel alloys.

14-202. Practical Procedures for Reducing Gas Porosity in Nonferrous Castings. A. E. St. John. *Iron Age,* v. 160, July 3, 1947, p. 46-48.
Recommended practices covering tin bronzes, the aluminum and silicon bronzes, the yellow brasses, and the manganese bronzes. Effects of fuel-fired and electric furnace melting. Atmosphere control, melting practice, superheating, stirring, deoxidizing, and pouring.

14-203. Centrifugal Casting. J. W. Moore and J. W. MacKay. *Mechanical Engineering,* v. 69, July 1947, p. 551-558.
The process as applied to stainless and carbon-steel tubes at American Cast Iron Pipe Co., Birmingham, Ala.

14-204. Recent Developments in Magnesium. J. C. McDonald. *Metal Progress,* v. 52, July 1947, p. 83-87.

Important improvements in foundry techniques, need for simplified designs, and some examples of test programs, which furnish the data whereby these simplifications can be confidently adopted. (To be continued.)

14-205. Installation du Moulage Mecanique Pour la Production de Petites et Moyennes Pieces. (Installation of Mechanical Molding for the Production of Small and Medium Objects.) Roger Lesage. *Fonderie,* no. 14, Feb. 1947, p. 541-545.

The mechanical casting of small parts such as constituents of hydraulic turbines and mechanical tools. Production increased 2½ times.

14-206. Modern Sand Casting. Thomas A. Dickinson. *Tool Engineer,* v. 18, July 1947, p. 39-43.

Recent innovations on the West Coast.

14-207. Making Plastic Patterns. E. J. McAfee. *American Foundryman,* v. 12, July 1947, p. 26-31.

Design and construction techniques.

14-208. Foundry Sand Reclamation. J. M. Cummings and W. M. Armstrong. *American Foundryman,* v. 12, July 1947, p. 35-39, 65.

Report on first phase of foundry research program sponsored by the British Columbia Research Council.

14-209. Flame Gouging; Applications in the Steel Foundry. J. A. Shuffstall. *American Foundryman,* v. 12, July 1947, p. 62-63.

Chipping operations in a foundry and the substitution of flame gouging for certain of these applications. Need of training of personnel in this work.

14-210. Casting Is Changing. Edwin Laird Cady. *Scientific American,* v. 177, Aug. 1947, p. 67-69.

New foundry techniques.

14-211. La Coulee Continue des Alliages Legers. (Continuous Casting of Light Alloys.) J. M. Peloutier. *Revue de l'Aluminium,* v. 24, March 1947, p. 84-93.

A water-cooled ingot mold, the base of which drops out at specified intervals, is used for continuous casting. Several variations of this mold suggested; data for dimensions and speeds.

14-212. Over het Voorkomen van Inwendig Glanzende Gietgallen bij het Gieton in Natte Zandvormen. (Appearance of Internally Bright Gas Holes on the Surface of Gray Cast Iron Where Green Sand Molds Are Used.) J. G. Hofman. *Metalen,* v. 1, May 1947, p. 158-160.

How investigations of such defects led to their explanation and to a method for avoiding or minimizing them.

14-213. The Centrifugal Casting of Copper Alloy Wheels in Sand Molds. O. R. J. Lee and L. Northcott. *Engineering,* v. 163, June 27, 1947, p. 556-560.

Influence of casting speeds and conditions and of segregation and structure on centrifugal sand castings of aluminum bronze, high-tensile brass, gunmetal, leaded gunmetal, and phosphor bronze. (Condensed from paper presented to the Institute of Metals.)

14-214. Reclamation of Foundry Sand. J. M. Cummings and W. M. Armstrong. *Western Miner,* v. 20, July 1947, p. 44-48.

The various methods for sand reclamation and results of a pilot-plant investigation of wet scrubbing in conjunction with furnace treatment and magnetic separation, especially as applied to local conditions in British Columbia.

14-215. Foundry Coke; Characteristics and Quality Factors. D. E. Krause and H. W. Lownie, Jr. *American Foundryman,* v. 12, July 1947, p. 47-58.

Reviews and summarizes published information on foundry coke, and presents test data to aid in prediction of the behavior of foundry cokes in cupola practice. (The review is based on *Chemical Abstracts* for 1936 to 1945.) 154 ref.

14-216. Procédés a Utiliser pour Corriger les Défauts Constatés dans le Moulage d'une Vis sans Fin. (Methods Used to Correct Defects Occurring in Casting an Endless Screw.) Pierre Simon and Gabriel Joly. *Fonderie,* May 1947. p. 655-657.

Fourteen steps in the preparation of a closed mold for casting an endless screw.

14-217. Fusion au Cubilot Avec un Coke de Tres Mauvaise Qualite. (Melting in a Cupola Furnace With Very Low Quality Coke.) Henry Gernelle. *Fonderie,* May 1947, p. 658-663.

A fuel for cupola-furnace melting, which has high porosity, low mechanical resistance, and high ash content. Changes in structure of cupola parts and variations in procedure to compensate for the poor coke.

14-218. Precision Casting. H. Evans, P. S. Cotton, and J. Thexton. *Metal Industry,* v. 71, July 4, 1947, p. 3-6; July 11, 1947, p. 23-26.

Technique used for high melting-point nickel alloys based on the use of zircon flour in the sprayed coating and of sillimanite in the investment.

14-219. Precision Casting of High Melting-Point Alloys Containing Nickel. Part II. H. Evans, P. S. Cotton, and J. Thexton. *Foundry Trade Journal,* v. 82, July 10, 1947, p. 223-227.

Details of recommended procedure based on the use of zircon flour in the sprayed coating and of sillimanite in the investment. 49 ref.

14-220. A Dry Sand Core Is Suggested. W. Gudgeon. *Foundry Trade Journal,* v. 82, July 10, 1947, p. 228.

How a peculiar shaped casting was produced much more easily with dry sand than with green sand.

14-221. Control of Bronze Melts for the Production of Pressure-Tight Castings. W. A. Baker. *Foundry Trade Journal,* v. 82, July 10, 1947, p. 229-233.

Work done over the past ten years by British Non-Ferrous Metals Research Assoc. on controlling porosity of tin-bronze castings.

14-222. Pressure Tightness; The Control of Porosity in Bronze Sand Castings. W. A. Baker. *Metal Industry,* v. 71, July 18, 1947, p. 43-46.

Work carried out during the past ten years by the British Non-Ferrous Metals Research Assoc.

14-223. Steel Casting Design Details Affect Quality of Product. Frank Kiper. *Product Engineering,* v. 18, Aug. 1947, p. 86-89.

Directional solidification and its control in the production of sound steel castings. Temperature gradient is divided into a transverse component and a longitudinal component. The use of the components by the designer to improve the quality of steel castings.

14-224. Blowing Cores on a Mass Production Basis. Maurice F. Degley. *Foundry,* v. 75, Aug. 1947, p. 72-74, 247.

Equipment, layout, and procedures for daily production of cores for 450 tons of automotive castings, such as cylinder heads and blocks, in the core department of Ferro Machine & Foundry, Inc., Cleveland.

14-225. The Casting of a Gray Iron Diesel Engine Liner. Noah A. Kahn and Bernard N. Ames. *Foundry,* v. 75, Aug. 1947, p. 66-71, 218-220.

The manner in which a jobbing shop can adapt itself to production casting in an emergency. How the New York Naval Shipyard solved the problem of producing 500 castings per month.

14-226. Conditions Affect Choice of Molding Method. Pat Dwyer. *Foundry,* v. 75, Aug. 1947, p. 82-83, 222, 224, 226.

Factors which influence choice. Design principles.

14-227. Producing Steel Castings by the Thermit Process. Robert C. Wayne. *Foundry,* v. 75, Aug. 1947, p. 84-87, 204, 206, 208, 210, 212, 214.

Process developed by the U. S. Navy during World War II, by which heats of up to several hundred pounds of carbon or alloy steel can be melted in 1 or 2 min.

14-228. Foundry Expansion Aids Production and Working Conditions. William G. Gude. *Foundry,* v. 75, Aug. 1947, p 94-96, 174-175.

Equipment, layout, and procedures followed at Christensen & Olsen Foundry Co., Chicago, in production of nonferrous castings of varied sizes and types.

14-229. Institute of British Foundrymen Holds 44th Annual Meeting. Vincent Delport. *Foundry,* v. 75, Aug. 1947, p. 97, 132, 134, 137.

Reviews of papers presented.

14-230. Determining Sand Moisture by Electrical Instrument. Charles Locke and Fred De Hudy. *Foundry,* v. 75, Aug. 1947, p. 180, 182.

Instrument described is claimed to be superior to the one described by Liddiard and Seal in *Foundry Trade Journal* for Nov. 14, 1946, in that it provides for controlled ramming of the sample, as well as for control of the other variables involved.

14-231. Principles of Precision Investment Casting. Part I. Kenneth Geist and Robert M. Kerr, Jr. *Foundry Trade Journal,* v. 82, July 17, 1947, p. 247-254.

History, methods, and equipment. The making of dental castings. (To be continued.)

14-232. Wetherill Vacuum Casting Process. W. A. Phair. *Iron Age,* v. 160, Aug. 14, 1947, p. 67-70.

Better yields, reduced foundry losses, improved operating conditions, and rapid production pouring are among the advantages attributed to a vacuum-casting method developed by Armour Research Foundation for Wetherill Engineering Co. Construction and operation of the unit and a typical steel-casting pouring cycle.

14-233. Principles of Precision Investment Casting. Part II. Kenneth Geist and Robert M. Kerr, Jr. *Foundry Trade Journal,* v. 82, July 24, 1947, p. 269-273.

Wax elimination, firing of mold, and melting and casting. (To be continued.)

14-234. Casting Fastening Hardware With Dies and Metal Molds. Herbert Chase. *Steel,* v. 121, Aug. 18, 1947, p. 94-96, 98, 130, 132, 134.

In processing shields and other components used with expansion bolts and similar fastenings, units, often including threads, are cast from zinc and lead alloys at a high production rate.

14-235. Continuous Casting. H. Kastner. *Metal Industry,* v. 71, Aug. 1, 1947, p 83-85.

German developments in the non-

ferrous field. (Abstracted from *Stahl und Eisen.*)

14-236. Making Dies for Casting Gray Iron. H. K. Barton. *Machinery (London)*, v. 71, July 31, 1947, p. 131-134.

Essentials of the Holley process for die casting gray iron are: a rotatable frame upon which a number of die carriages are mounted, and a source of molten metal which allows tapping at shorter intervals than is normal in iron-founding practice. Sand casting of dies; standardizing a limited number of die sizes.

14-237. Some Notes on Feeding. S. L. Finch. *Foundry Trade Journal*, v. 82, July 31, 1947, p. 297-303.

Crystallization, solidification and subsequent shrinkage. The growth of metallic crystals, latent heat of fusion, specific heat and gas content as related to the mechanism of freezing.

14-238. Abrasive Blasting of Castings. R. L. Orth. *American Foundryman*, v. 12, Aug. 1947, p. 22-25.

Castings are blasted to remove the mold elements that stick to the internal and external surfaces, as well as the scale formed by oxidation when the molten metal comes in contact with the mold or through subsequent annealing and heat treating operations. Advantages, and selection and operation of equipment.

14-239. Preventing Shrinkage in Gray Iron Castings; Tellurium Corewashers as Chill Inducers. W. P. Sullivan. *American Foundryman*, v. 12, Aug. 1947, p. 26-28.

Application and beneficial effects of a tellurium-base corewash in avoiding shrinkage in the gray iron foundry.

14-240. Precision Casting Small Aluminum Impellers. Eugene M. Cramer. *American Foundryman*, v. 12, Aug. 1947, p. 36-38.

Production of limited numbers of sample parts presented problems requiring a plaster mold, with adaptations of semicentrifugal and static casting techniques. Two types of impellers were produced, one type permitting parting along edges of the blades and diagonally across the rim; the other having overlapping blades.

14-241. Engineering and Design of Aluminum Permanent Molds. E. G. Fahlman, E. V. Blackmun, W. J. Brinkman, H. R. Doswell, W. J. Klayer, G. C. Kohls, C. H. Morrison and E. C. Nocar. *Modern Metals*, v. 3, Aug. 1947, p. 24-25.

A permanent mold casting is one which is made in a heated metal mold with or without the use of sand or metal cores and poured by gravity only, and is gated and fed very much the same as a sand casting, but within the limitation of the process. When a sand core is used the casting is known as a semipermanent mold casting.

14-242. Die Casting Aircraft Parts. H. L. Harvill. *Modern Industrial "Press"*, v. 9, Aug. 1947, p. 44, 46, 48.

Presses designed for cold-chamber die casting (whereby a molten alloy is ladled from a melting pot into an injection cylinder on the die-casting machine, so that it can be forced into a closed die by means of a piston acting in a cylinder) and hot chamber die casting (during which the injection cylinder of the machine is either wholly or partly immersed in a molten alloy).

14-243. The Foundry Atmosphere. William N. Witheridge. *Iron Age*, v. 160, Aug. 21, 1947, p. 62-67.

Means of improving atmosphere conditions; common misconceptions concerning ventilating techniques; dust control equipment.

14-244. Principles of Precision Investment Casting. Part III. Kenneth Geist and Robert M. Kerr, Jr. *Foundry Trade Journal*, v. 82, July 31, 1947, p. 291-296.

Air pressure makes the casting, because when the vacuum is created in this instance, the atmospheric pressure forces the metal into place.

14-245. Pressure Die Casting Magnesium. J. L. Erickson. *Light Metals*, v. 10, Aug. 1947, p. 390-395.

Development and practice of pressure casting for the ultralight alloys, and fundamental theory in comparison with the process as applied to aluminum.

14-246. Present and Future Heating Applications in Precision Casting. Paul L. Butler. *Industrial Gas*, v. 26, Aug. 1947, p. 20, 26, 28.

Fabrication of a master pattern, use of the pattern in making a mold, injection of wax into the mold to produce a wax pattern. The control and kind of heat in all steps of the process are perhaps the most important factors in the successful manufacture of precision castings.

14-247. The Foundry Atmosphere. Part II. William N. Witheridge. *Iron Age*, v. 160, Aug. 28, 1947, p. 67-73.

Practical suggestions for improving the atmosphere of foundries, large and small. Engineering problems, measurement of air contamination, salvage of existing equipment, air sources, outdoor air pollution, the smoke nuisance and costs.

14-248. Some Notes on the Surface Drying of Molds. A. Cracknell and F. Cousans. *Foundry Trade Journal*, v. 82, Aug. 7, 1947, p. 313-315; Aug. 14, 1947, p. 343-347; Aug. 21, 1947, p. 365-369.

The effect of varying the volume

and temperature of the air passing over the surface of a mold, when rammed with sand, has been studied and an attempt made to correlate these factors with the time taken to dry out the surface layers. The effect of variation in grain size and permeability of sands; some results of air, skin, and torch drying. (Presented at Nottingham Conference of Institute of British Foundrymen.)

14-249. Discussion on Control of Bronze Melts for the Production of Pressure-Tight Castings. *Foundry Trade Journal*, v 82, Aug. 7, 1947, p. 317-318, 324.

Discussion of paper by W. A. Baker in July 10th issue. Temperature gradient; oxidation of melts; degassing treatments; mold reaction.

14-250. Some Notes on Feeding. S. L. Finch. *Foundry Trade Journal*, v. 82, Aug. 7, 1947, p. 319-324. (Concluded.)

The flow of metal from feeder head to casting; suggestions for improvements in methods. (Presented at Nottingham Conference of Institute of British Foundrymen.)

14-251. Die Casting for Aluminum Engines. Gilbert Close. *Light Metal Age*, v. 5, Aug. 1947, p. 6-7.

The use of aluminum die casting has resulted in three advantages; namely, very few machine operations are required, rejected parts are held to a minimum, redesign of motors in production, or institution of new motor types, requires a minimum of retooling with major costs confined to replacement of die-caster dies.

14-252. Present and Future Heating Applications in Precision Casting. Paul L. Butler. *Industrial Heating*, v. 14, Aug. 1947, p. 1290, 1292, 1294.

The various heat operations and suggested improvements in the production of precision castings, from the preparation of the molds to the heat treatment of the castings.

14-253. Convection Currents in Gray Cast Iron. J. H. Schaum. *Foundry*, v. 75, Sept. 1947, p. 66-69, 192, 194, 198, 200.

Influence of convection currents from observations of segregation, shrinkage, and temperature from the side feeding of steel castings.

14-254. How to Prevent Snagging Wheel Breakage. R. B. Fair. *Foundry*, v. 75, Sept. 1947, p. 70-72, 180, 182, 184, 186.

Causes for wheel breakage in the snagging room are rough handling, poor machine condition, improper grinding practice, and improper mounting. How these can be avoided.

14-255. Gas and Shrinkage in Tin Bronzes. E. F. Tibbetts. *Foundry*, v. 75, Sept. 1947, p. 74-77, 164, 168, 170, 172, 175.

The similarity in appearance of gas and shrinkage when present in small amounts and the serious effect of such slight unsoundness on physical properties and pressure tightness.

14-256. Fundamentals of Molding Machines. Elmer A. Blake. *Foundry*, v. 75, Sept. 1947, p. 78-83.

Applications of different types of molding machines.

14-257. Heat Absorption of Molding Sand. Harry W. Dietert, Edward J. Hasty and R. L. Doelman. *Foundry*, v. 75, Sept. 1947, p. 84-85, 228, 230, 232.

Measuring and results of the heat conductivity of rammed molding sand specimens 4 in. in diameter and 1 in. in thickness, of specified physical properties.

14-258. Effect of Pouring Temperature on Test Bar Properties of 85-5-5-5 Alloy. L. W. Eastwood and J. G. Kura. *Foundry*, v 75, Sept. 1947, p. 86-88, 175, 178-179.

The average and representative individual effects of pouring temperature on properties of test bars of five different designs poured from various melts.

14-259. Selecting Proper Pattern Equipment. Ray Olsen. *Foundry*, v. 75, Sept. 1947, p. 93, 215-216.

Patterns can be constructed of several different materials and in a number of different fashions.

14-260. Surface Quality in Alloy Steel Castings as Affected by Sand Mixtures and Mold Washes. H. E. Crivan. *Metal Treatment*, v. 14, Summer 1947, p. 84-92.

Some experiments in this field. Special consideration is given to the requirements of 13% manganese steel.

14-261. Current Views on Precision Casting. *Foundry Trade Journal*, v. 82, Aug. 14, 1947, p. 337-342.

Discussion of two papers presented at the Nottingham I.B.F. Conference. Mold coating; present limitations of the process; hot tears; casting threaded work; the Shaw method; production costs; multiple molds; joining pattern and feeding heads.

14-262. Pinhole Porosity; Investigations With Aluminum Alloy Castings. C. C. Griffin and L. G. Stephens. *Metal Industry*, v. 71, Aug. 15, 1947, p. 123-125; Aug. 22, 1947, p. 150-152.

Effects of water vapor whether produced from the combustion of gas or oil or derived from the air; the use of a flux which has the power to dissolve and combine with the Al_2O_3 skin.

14-263. Die-Casting Inserts. J. L. Erickson. *Metal Industry*, v. 71, Aug. 15, 1947, p. 129-130.

Recommended techniques for magnesium alloy castings.

14-264. Continuous Casting. H. Kastner. *Metal Industry,* v. 71, Aug. 15, 1947, p. 131-132.

Review of German developments in the nonferrous field. (Concluded.)

14-265. Practical Aspects of Gray Iron Inoculation. E. V. Somers and D. W. Gunther. *Iron Age,* v. 160, Sept. 4, 1947, p. 72-75.

Explains, from the practical foundryman's viewpoint, what inoculation is, how and where it can be most profitably applied, its effect, and types of inoculants available.

14-266. Modernized Foundry to Make It a Better Place to Work. *Factory Management and Maintenance,* v. 105, Sept. 1947, p. 74-76.

New installations at U. S. Rubber Co., Shoe Hardware Div., Waterbury, Conn.

14-267. Small Bushing With Green Sand Cores. *Foundry Trade Journal,* v. 82, Aug. 21, 1947, p. 370.

Bronze bushings can be made vertically without the use of dried cores by the employment of a simple stripping plate.

14-268. Mobile Pig-Casting Machine. *Engineering,* v. 164, Aug. 22, 1947, p. 176-177.

Machine for continuous casting of iron, lead, aluminum, and other nonferrous metals and alloys, manufactured by British firm.

14-269. Nonuniformity of Mechanical Properties of a ND-DKI Cast Steel Turbine Cylinder. V. P. Desnitskii. *Boiler and Turbine Manufacture (U.S.S.R.),* April 1947, p. 24-26. (In Russian.)

Mechanical properties of samples taken from various sections of a cast turbine cylinder. Drawings show the location of the various test specimens.

14-270. An Analysis of Surface Quality of Zinc-Base Die Castings. A. W. Sundwick. *Steel,* v. 121, Sept. 15, 1947, p. 94-95, 136, 138-143.

Causes of various surface imperfections such as chills, splashing, gateholes, cold-laps, soldering, and swirls as they are influenced by die design and by variations in alloy composition.

14-271. The Story of a Fan. F. L. Culver. *Die Castings,* v. 5, Sept. 1947, p. 51-52.

Production of combination motor support and cooling fan. Sand casting was a complicated operation, requiring machining and hand cleaning, and quality was poor. Permanent mold casting produced a better fan, but still inferior from functional and cost standpoints. Die casting proved to be less expensive and to have other advantages.

14-272. Modern Foundry Layout Gives Clean Working Conditions. *Automotive Industries,* v. 97, Sept. 15, 1947, p. 41.

Layout of Freeport Works of Fairbanks, Morse and Co. This foundry pours only one type of metal—an electric-furnace cast iron from machine-shop chips and turnings, gates, and sprues.

14-273. Casting Steel Mill Rolls. *Steel,* v. 121, Sept. 22, 1947, p. 80-82, 112.

Procedures and equipment used by Mackintosh-Hemphill Co., Pittsburgh.

14-274. Casting Magnesium in Metal Molds. Herbert Chase. *Iron Age,* v. 160, Sept. 25, 1947, p. 73-76.

Method used at the Teterboro plant of Bendix Aviation Corp. in producing parts as die castings and in permanent and semipermanent molds. A magnesium die-casting alloy featuring improved ductility and impact strength.

14-275. Foundry Sand Reclamation. J. M. Cummings and W. M. Armstrong. *Canadian Institute of Mining and Metallurgy Transactions* (bound with *Canadian Mining and Metallurgical Bulletin*), v 50, Aug. 1947, p. 448-459.

Several different methods. Development of an economic process for British Columbia, where sand has to be shipped in to sell at $11 to $12 per ton. Flow sheet for proposed scheme for small foundries.

14-276. The Production of Die Castings for Ford Carburetors. Herbert Chase. *Machinery (London),* v. 71, Aug. 28, 1947 p 242-246.

Methods used by Ford Motor Co.

14-277. Counter-Gravity Casting Saves Scrap and Metal. *American Machinist,* v. 91, Sept. 25, 1947, p. 81.

A new process developed at Armour Research Foundation cuts the number of defects attributable to slag, reduces to a minimum defects from mold sand, lowers greatly the number of defectives caused by pinholes or porosity, allows successful production of castings with thinner sections than those obtainable by conventional techniques, and appreciably increases the yield from the metal used

14-278. Surface Quality of Die Castings. A. L. Sundwick. *American Machinist,* v. 91, Sept. 25, 1947, p. 127, 129, 131.

A study of a number of A.S.T.M. Alloy XXV castings to determine the reasons for poor surface quality. Radiographs disclosed that there is no strict correlation of porosity with surface imperfections. Causes of chills, splashes, soldering or fusing, gatehole defects, and cold-laps; recommendations for their avoidance.

14-279. Remèdes Préconisés Pour Eviter les Porosités dans les Pièces Moulées en

Fonte. (Remedies Suggested for Avoiding Porosity of Iron Castings.) Gabriel Joly. *Fonderie,* June 18, 1947, p. 692-693.
Causes of porosity; the chemical composition of good cast iron; suggested mixtures for cupola furnaces.

14-280. Holding Loose Pieces. *Foundry Trade Journal,* v. 82, Aug. 28, 1947, p. 396.
Method for holding loose pieces in their correct position while the core is being made and also to allow easy and quick release from the corebox before withdrawing the core.

14-281. Iron Alloy Melting Practice in a New England Foundry. Arthur Q. Smith. *Industrial Gas,* v. 26, Sept. 1947, p. 13-14, 34.

14-282. Nonferrous Foundry Practice. W. G. Mochrie. *Metal Industry,* v. 71, Sept. 5, 1947, p. 203-205.
Recent advancements. 19 ref. (To be concluded.)

14-283. Kontrola Jakosti Pri Seriove Vyrobe Odlitku z Lehkych Slitin. (Quality Control in Mass Production of Light-Alloy Castings.) Jiri Mackievic. *Hutnické Listy,* v. 1, Oct. 1946, p. 79-83.
A recommended visual inspection for the furnaceman. A series of test pieces are obtained by casting at temperature intervals between 660 and 880° C. Observation of the structure visible on breaking the pieces indicates the suitability of the metal.

14-284. Problem Odstranovani Nalitku ve Slevarnach. (Problem of Removal of Risers From Foundry Castings.) Jiri Mackievic. *Hutnické Listy,* v. 1, Dec. 1946, p. 121-129.
New method used in U.S.S.R. since 1941. A special plain core with a central opening whereby the riser is connected to the casting by a thin neck which can be readily broken-off mechanically is placed in the mold between the riser and casting. Results obtained in the U. S. and Czechoslovakia with different metals.

14-285. Synteticke Pisky pro liti Ocelove Litiny na Syrovo. (Synthetic Binders for Greensand Molds for Steel Castings.) Bretislav Picman. *Hutnické Listy,* v. 1, Jan. 1947, p. 151-155.
The use of bentonite as a binder. Its advantages and preparation of these sands.

14-286. Je Formovani do Kremiciteho Pisku s Prisadou Cementu Rentabilni? (Does Molding With Silica Sand With a Cement Binder Pay?) Jos. Vorlicek. *Hutnické Listy,* v. 1, March 1947, p. 200-202; April 1947, p. 220-224.
The advantages and disadvantages of the above, which the author has introduced in his foundry for all castings weighing over 80 kg. Cost of cleaning castings was reduced about 19% during the first year; further savings are expected in the future.

14-287. Spendlikove Pory u Ocelovych Odlitku. (Pinholes in Steel Castings.) J Mackievic. *Hutnické Listy,* v. 1, May 1947, p. 245-249; June 1947, p. 273-276.
Experiments indicate that pinholes are caused by nascent hydrogen formed by decomposition of mold moisture on pouring of the hot metal into a greensand mold, the hydrogen being absorbed by the surface layer of the casting. Recommends complete deoxidation of the molten metal before pouring, preferably with aluminum.

14-288. Molding Machines. E. A. Blake. *American Foundryman,* v. 12, Sept. 1947, p 31-35.
Advantages and disadvantages of the various types.

14-289. Foundry Coke Quality Effect on Cupola Melting. D. E. Krause. *American Foundryman,* v. 12, Sept. 1947, p. 44-49.
Objective of this discussion is not to set up standards for coke quality or to consider the various factors that may affect the quality of coke. Its prime purpose is to indicate what may be expected in cupola operation with a change in coke quality and, also, what may be done in order to get the best results out of the coke available. (Presented at 51st Annual Meeting, American Foundrymen's Assoc., Detroit, April 29, 1947.)

14-290. Making Rolls. *Western Metals,* v. 5, Sept. 1947, p. 18-19.
Importance of well-made rolls. Casting and cooling of the rolls.

14-291. Discussion on Some Notes on Feeding. *Foundry Trade Journal,* v. 83, Sept. 4, 1947, p. 3-6.
Discussion of paper by S. L. Finch (July 31 and Aug. 7 issues) on practical and theoretical aspects of the feeding of steel castings.

14-292. Nonferrous Foundry Practice. (Concluded.) W. G. Mochrie. *Metal Industry,* v. 71, Sept. 12, 1947, p. 223-224.
New equipment, methods, die-casting techniques, reclamation policies applied to production of nonferrous art founding and instrument founding.

14-293. Automatic Molding Machine. *Metal Industry,* v. 71, Sept. 19, 1947, p. 249.
New development in foundry mechanization.

14-294. New Coreroom is Model of Efficiency. Pat Dwyer. *Foundry,* v. 75, Oct. 1947, p. 66-71, 130.
Layout and procedures in new coremaking department of Cleveland Foundry Co., Cleveland.

14-295. Effect of Chills on Rate of Solidification of Gun Metal. William J. Richmond. *Foundry,* v. 75, Oct. 1947, p. 72-73, 252, 254, 256.

Results of an investigation of the effect of sand, steel, carbon, and graphite as mold materials on the rate of solidification of gun metal (88% Cu, 8% Sn, and 4% Zn).

14-296. Control of Grain Size in Magnesium Casting Alloys. Vernon C. F. Holm and A. I. Krynitsky. *Foundry,* v. 75, Oct. 1947, p. 81, 228, 230, 232, 234, 236, 238, 240.

New procedure developed at Bureau of Standards in which the molten alloy is treated with lump magnesite. Results obtained when magnesium alloy melts are superheated, treated with solid carbonaceous materials, with carbon monoxide, or with lump magnesite.

14-297. Effect of Mold Material on Gas Absorption by 85-5-5-5 Alloy. L. W. Eastwood and J. G. Kura. *Foundry,* v. 75, Oct. 1947, p. 86-91, 156, 158, 160, 162.

Effect of moisture content in natural sand; effect of A.F.A. permeability; and effect of baking temperature and type of bond. Natural greensand compared with other mold materials and effect of mold materials on properties of 85-5-5-5 alloy in the horizontal ⅝-in. web Webbert test bar

14-298. Experience Can Point Way to Better Castings. Clyde L. Frear. *Foundry,* v. 75, Oct. 1947, p. 92-93, 206, 208, 210, 212, 214, 216, 218, 220.

Lessons learned in war production which can be applied to present-day problems.

14-299. Sand Control. G. W. Anselman. *Foundry,* v. 75, Oct. 1947, p. 97, 164, 166, 168, 170, 172.

Factors involved in the selection of the proper sands, clays, and other molding materials.

14-300. Report on Die Casting. Thomas A. Dickinson. *Tool Engineer,* v. 19, Oct. 1947, p. 23-28.

Principles of hot and cold chamber methods.

14-301. Copperspun Squirrel-Cage Rotor. G. R. Anderson. *Electrical Engineering,* v. 66, Oct. 1947, p. 980-982.

The name "Copperspun" describes a one-piece squirrel-cage rotor centrifugally cast of copper. Salient features are high strength, high melting point, no joints, low coefficient of expansion, high conductivity, low porosity, and improved dynamic balance.

14-302. Recent Developments in Metals and Their Processing. W. F. Craig, Jr., R. A. Lubker, and W. E. Mahin. *Machine Design,* v. 19, Oct. 1947, p. 71-78.

Reviews H-steels, boron in steel, developments in stainless and tool-steels; secondary aluminum, new magnesium and copper alloys, high-temperature alloys; use of castings and developments in centrifugal, permanent mold and precision casting; new welding advances and brazing of aluminum; powder metallurgy.

14-303. Iron Foundry Advances in the Chicago Area. H. Kenneth Briggs. *Metal Progress,* v. 52, Oct. 1947, p. 578-580.

Outstanding achievements of the last decade include improved melting equipment, new combinations of furnaces for continuous melting, close control of carbon.

14-304. A Revolution in the Bronze Foundries. J. D. Zaiser. *Metal Progress,* v. 52, Oct. 1947, p. 603-605.

Developments of the past 30 years.

14-305. Thirty Years in Steel Founding. H. W. Maack. *Metal Progress,* v. 52, Oct. 1947, p. 631-635.

The 30-year history of this industry particularly in relation to a steel foundry producing castings for valves and fittings. Melting, casting, heat treatment, mechanical handling, and inspection procedures, and a research foundry.

14-306. Brass Foundry Practice at Crane Co. H. M. St. John. *Metal Progress,* v 52, Oct. 1947, p. 636-639.

Improvements in foundry practice including furnaces, pouring temperature control, mechanical conveying, specifications of materials and salvage.

14-307. Role of Centrifugal Casting in Transforming Pigs to Pipe. Gerald Eldridge Stedman. *Steel,* v. 121, Oct. 13, 1947, p. 90-92, 94, 122, 124.

Manufacturing procedure for producing 3-in. to 24-in. cast-iron pipe, 18 ft. long, from pig iron and scrap to hydrostatically tested finished product.

14-308. The Influence of Production Flow on Molding Methods in Iron Foundries and Its Effect on P.M.H. and General Efficiency. R. C. Shepherd. *Foundry Trade Journal,* v. 83, Sept. 11, 1947, p. 21-30, 33; Sept. 18, 1947, p. 43-51; Sept. 25, 1947, p. 67-74.

The need for giving immediate consideration to the use of improved molding methods. A greater use of production-flow methods in molding shops is advocated. Some effects of production-flow operation on various aspects of molding work. Details of recommended materials-handling procedures. (Presented at Nottingham Conference of Institute of British Foundrymen.)

14-309. Pattern Construction. *Foundry Trade Journal,* v. 83, Sept. 25, 1947, p. 66.

Improved construction for bracket pattern to avoid warping and splitting of the wood.

14-310. The Piel and Adey Gravity Die Casting Process. *Machinery (London)*, v. 71, Sept. 25, 1947, p. 356-357.

Technique used by the German firm of Piel and Adey for thin-walled components in copper-base alloys. Essentials were use of highly fluid brasses containing substantial additions of aluminum, tilting of the mold about its lower edge while pouring, vibration of the mold, and use of a specified die dressing. (From B.I.O.S. Final Report No. 649, Item No. 21.)

14-311. Pouring Open-Sand Box Parts. W. Gudgeon. *Iron and Steel*, v. 20, Oct. 1947, p. 494.

Technique for avoiding overlaps.

14-312. Oliver Corp. Modernizes Its South Bend Foundries. *Link-Belt News*, v. 14, Oct. 1947, p. 1-3.

Layout, procedures and equipment.

14-313. Manufacture of Precision Castings. G. Vennerholm and E. Ensign. *SAE Quarterly Transactions*, v. 1, Oct. 1947, p. 640-649.

Various methods for manufacturing precision castings. Special emphasis is placed on the investment-molding method. Processes included are die casting, permanent-mold casting, investment molding, plaster molding, and combinations of two or more methods. (Presented at S.A.E. Annual Meeting, Detroit, Jan. 6, 1947.)

14-314. The Efficient Manufacture of Cast Iron Pipe. Gerald Eldridge Stedman. *Industrial Gas*, v. 26, Oct. 1947, p. 10-11, 31.

Procedures and equipment used by National Cast Iron Pipe Division of James B. Clow & Sons, Birmingham, Ala.

14-315. Good Housekeeping Helps Foundry Operation. Arthur Q. Smith. *Industrial Gas*, v. 26, Oct. 1947, p. 19, 25-26.

Layout and equipment of a small foundry devoted to manufacture of brass and bronze castings.

14-316. Phenolic-Resin Binders; Utilization in Sand Cores for Ferrous Castings. J. E. McMillan and E. E. McSweeney. *American Foundryman*, v. 12, Oct. 1947, p. 22-26.

Composition of phenolic resins and physical properties of the resin-bonded cores developed at Battelle Memorial Institute for use in heavy-metal founding. Results of laboratory and foundry tests which show that phenolic resins have definite advantages as core binders.

14-317. Controlling Carbon in the Cupola. W. W. Levi. *American Foundryman*, v. 12, Oct. 1947, p. 28-34.

Some of the variables which affect carbon control when melting iron in the cupola, and an equation for calculating the percentage of carbon to be expected in the iron at the cupola spout. (Presented at 51st Annual Meeting, American Foundrymen's Assoc., Detroit, April 28-May 1, 1947.)

14-318. Feeding Castings. S. L. Finch. *American Foundryman*, v. 12, Oct. 1947, p. 51-61.

Presented at 44th Annual Meeting of Institute of British Foundrymen, June 17-20, 1947, Nottingham, England (see item 14-237).

14-319. Sand, Gravity or Pressure? E. Carrington. *Light Metals*, v. 10, Oct. 1947, p. 526-531.

Factors affecting choice of casting methods for aluminum castings.

14-320. Making Steel Mill Rolls. *Western Machinery and Steel World*, v. 38, Oct. 1947, p. 92-93.

Manufacture at Mackintosh-Hemphill Co.

14-321. The "Lost Wax" Process. *Weld* (formerly *Victor Weld*), v. 3, Oct. 1947, p. 16-18.

Production of small precision parts by Lawrence Laboratory, Santa Monica, Calif.

14-322. Carbon Pickup in Melting Cast Iron. P. H. Shotton. *Foundry Trade Journal*, v. 83, Oct. 9, 1947, p. 115.

The factors responsible for carbon pickup in cupola melting and in electric and rotary furnace practice. In the latter a variety of carbonaceous materials are added to increase the carbon content of the product. Relative efficiencies.

14-323. The Chipping Operation. R. E. Chapman. *Foundry*, v. 75, Nov. 1947, p. 72-75, 228, 230, 232, 234, 236, 238.

The chipping foreman; the chipper; tools used by the chipper; the chipping operation as conducted in the foundry. (Presented at 2nd Annual Technical and Operating Conference of Steel Founders' Society of America, Cleveland, June 6, 1947.)

14-324. New Gray Iron Foundry Combines Efficiency and Cleanliness. William G. Gude. *Foundry*, v. 75, Nov. 1947, p. 76-81.

Layout and equipment of Wells Mfg. Co.'s new foundry in Skokie, Ill.

14-325. Visual Analysis of Sand Grain Distribution. C. A. Sanders. *Foundry*, v. 75, Nov. 1947, p. 82-84, 216.

Five visual screen analyses using the test-tube method; respective advantages or disadvantages. A sand with wide grain distribution (from 30 to 200 mesh) is recommended for easy bonding and best over-all properties.

14-326. Permanent Mold Casting of Aluminum. Edwin Bremer. *Foundry,* v. 75, Nov. 1947, p. 86-89, 223-224, 226, 228.

Procedures and equipment used in production of about 1,500,000 lb. of castings per month at Cincinnati foundry of Aluminum Industries, Inc.

14-327. Belgian Foundries. Vincent Delport. *Foundry,* v. 75, Nov. 1947, p. 92-93, 218, 220, 222.

Present Belgian foundry practice, based on information obtained during recent visit.

14-328. Reliability of Test Bar Properties as a Measure of the Quality of 85-5-5-5 Alloy Melts. L. W. Eastwood and J. G. Kura. *Foundry,* v. 75, Nov. 1947, p. 94-99, 168.

Recommendations on test bar practice for 85-5-5-5 alloy are given in this seventh and concluding article based on investigations sponsored by the Non-Ferrous Ingot Metal Institute.

14-329. Use of Exothermic Cores in Pouring Stainless Steel. Maurice Beam. *Foundry,* v. 75, Nov. 1947, p. 140, 142.

Use to promote adequate feeding of the castings by maintaining the riser metal fluid until the casting has solidified. In addition to exothermic cores or ring inserts placed under feeding heads, an exothermic powder compound is also placed on top of the risers immediately after filling the mold.

14-330. A Realistic Appraisal of the Precision Investment Casting Process. W. O. Sweeny. *Iron Age,* v. 160, Nov. 6, 1947, p. 86-90.

Overly enthusiastic claims have served to confuse designers and embarrass castings producers. A sound, realistic understanding of the advantages and limitations of the process is desired. Considerations are tolerances, holes, walls, edges, threads, surfaces, size, weight, and inspection.

14-331. Centrifugal Casting. *Metal Industry,* v. 71, Oct. 24, 1947, p. 349.

Methods employed by German technicians. (Condensed from a recent F.I.A.T. report.)

14-332. Coulée en Coquille de Pièces en Alliages de Magnésium. (Chill Casting of Magnesium Alloy Objects.) Jean Duport. *Fonderie,* Aug. 1947, p. 770-772.

Alloy compositions, melting techniques, and equipment required.

14-333. The Economics of Mechanical Shakeout. James L. Yates. *Iron Age,* v. 160, Nov. 13, 1947, p. 88-93.

Specific operating data covering a variety of sizes and types of flasks.

14-334. Temperovani litiny s Cernym Lomem. (Annealing of Black Heart Malleable Cast Iron.) Milos Knotek. *Hutnické Listy,* v. 2, Aug. 1947, p. 31-36.

How to achieve considerable economy and improvement in quality in the production of malleable castings, without use of pig iron, by properly planned annealing. Deoxidation with aluminum and effects of copper additions.

14-335. Entwicklung und Gegenwärtiger Stand des Stranggiessens von Nichteisenmetallen. (Development and the Present State of the Continuous Casting of Nonferrous Metals.) Hermann Kästner. *Stahl und Eisen,* v. 66-67, Jan. 2, 1947, p. 10-19.

Development and present status of the industry in Germany. Diagrams showing equipment and procedures.

14-336. Zhotovovani Trvalych Forem k Odlevani Odlitku ze Sede Litiny. (Preparation of Semipermanent Molds for Gray-Iron Castings.) Josef Vorlicek. *Hutnické Listy,* v. 2, Sept. 1947, p. 61-65.

The factors involved in preparation of the above and a detailed description of the preparation of molds and the casting procedure by which 50 to 100 (some say up to 170) pieces are produced with one mold. Composition of the mold material and the mold coating. Cost savings are said to be 50 to 65%.

14-337. Observations on the Control of Grain Size in Magnesium Casting Alloys. Vernon C. F. Holm and Alexander I. Krynitsky. *Journal of Research of the National Bureau of Standards,* v. 39, Sept. 1947, p. 265-270.

See item 14-296.

14-338. A Problem of Venting. *Foundry Trade Journal,* v. 83, Oct. 23, 1947, p. 156.

Various solutions to the problem of venting of hollow cast-iron rollers having cored holes at either end.

14-339. Casting Artistic Bronzes. Pat Dwyer. *Foundry,* v. 75, Nov. 1947, p. 66-71.

Procedures and products. (To be concluded.)

14-340. Effect of Selenium Additions to Cast Steel. T. N. Armstrong. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 250-254; discussion, p. 254-257.

Laboratory and commercial results which indicate that selenium is capable of improving the ductility of steel castings.

14-341. Controlled Pouring by the Wetherill Counter-Gravity Casting Process. Roy D. Haworth and W. C. Wick. *Frontier,* v. 10, Sept. 1947, p. 3-6, 17.

The technique consists of sucking molten metal under controlled vacuum into the bottom of the mold without turbulence and without gas and dirt entrapment.

14-342. Bronze Founding—A Review of Some Recent Developments. Frank Hudson. *Metallurgia,* v. 36, Oct. 1947, p. 303-308.

Presented before Belgian foundrymen at Brussels. 15 ref.

14-343. Preview of Elyria Alloy Foundry Held. *American Foundryman,* v. 12, Nov. 1947, p. 48, 87.

Layout and equipment of new foundry of Electro-Alloys Division of American Brake Shoe Co.

14-344. Aluminum and Magnesium Castings Impregnation. E. V. Blackmun. *American Foundryman,* v. 12, Nov. 1947, p. 49-55; discussion, p. 55.

Recommended methods for leak testing of castings; types of impregnating materials and their properties; pressure-tight alloys; sodium silicate impregnation by immersion and by pressure; styrene-resin impregnation; the vacuum-pressure method; effects of cleaning, anodizing, painting, heat treating, and baking on the process and on product properties. 10 ref.

14-345. 1947 Apprentice Contest; Pattern Division Entries Take Many Forms. L. F. Tucker. *American Foundryman,* v. 12, Nov. 1947, p. 56-57.

Three prize-winning patterns for a specific molding job; three patterns which are considered impractical.

14-346. Melting High-Magnesium Aluminum-Base Alloys. F. A. Allen. *Light Metals,* v. 10, Nov. 1947, p. 567-568.

Nature and properties of the structurally important, binary, aluminum casting alloys with high magnesium contents. Recommended melting practice compared with that required by normal aluminum alloys and by magnesium-base compositions.

14-347. Water Power From Stainless Steel. A. B. Jackson, III. *Western Metals,* v. 5, Nov. 1947, p. 20-21.

Production of turbines for hydroelectric plants by casting of stainless steel.

14-348. Curious Wasters. *Iron and Steel,* v. 20, Nov. 1947, p. 506.

Some unusual defects in castings.

14-349. Electro-Alloys Foundry Equipped With Latest Type of Facilities. *Blast Furnace and Steel Plant,* v. 35, Nov. 1947, p. 1361-1364.

Facilities, layout, and procedures of new high-alloy foundry.

14-350. Causes of Die Casting Irregularities. James L. Erickson. *Iron Age,* v. 160, Nov. 13, 1947, p. 82-87, 151; Nov. 20, 1947, p. 80-86.

Normal characteristics of die castings; effects of pressure, temperature, and design; irregularities affecting surface finish. Causes of some common die casting irregularities affecting dimensional tolerances, mechanical properties, and machinability.

14-351. Why Cast Steel Centrifugally? J. F. B. Jackson. *Iron Age,* v. 160, Nov. 27, 1947, p. 64-69.

Advantages and limitations from a British viewpoint; fields of application. It is thought in Britain that some American terminology is misleading. The role played by fluid pressure in producing sound, high-yield work.

14-352. Cutting the Cost of Portable Tool Operations. D. S. Linton. *Foundry,* v. 75, Dec. 1947, p. 84-87, 212, 214, 216.

Effects of low air pressures and how to correct them, including calculation of correct pipe sizes for the air lines. Determination of pressures close to the work with a hypodermic-needle pressure gage.

14-353. Mold Strength. Harry W. Dietert, H. H. Fairfield, and Edward Hasty. *Foundry,* v. 75, Dec. 1947, p. 94-95.

Mold strength is defined as the compressive strength of the sand at the face of a mold. How it can be measured with the mold-hardness tester; relationships of these values to dry and green compression strengths, and to permeability.

14-354. Converts Dairy Into Modern Nonferrous Foundry. Pat Dwyer. *Foundry,* v. 75, Dec. 1947, p. 90-93, 204, 206, 208, 210.

Procedures and equipment of Fischer Casting Co., N. Plainfield, N. J.

14-355. Casting Artistic Bronzes. (Concluded.) Pat Dwyer. *Foundry,* v. 75, Dec. 1947, p. 96-99, 125, 128.

Foundry practice at the Roman Bronze Works, Corona, L. I., N. Y.

14-356. Casting a 14-Ft. Sheave. *Foundry,* v. 75, Dec. 1947, p. 100.

Casting a 168-in., 19-groove, gray-iron Texrope sheave.

14-357. Cereal Core Binders of Various Types Studied. C. L. Mehltretter. *Foundry,* v. 75, Dec. 1947, p. 224, 226.

Green compression and baked tensile strengths of core-sand mixtures made with gelatinized wheat, rye and barley starches, and flours are compared with those obtained with a commercial binder of heat-gelatinized corn flour.

14-358. The Foundry of Tomorrow Today. C. B. Dick. *Scientific American,* v. 177, Dec. 1947, p. 252-254.

Improvements in foundry working conditions by purifying the atmosphere and by use of machinery to eliminate much heavy lifting.

14-359. Precision Casting Small Aluminum Impellers. Eugene M. Cramer.

Aluminium and the Non-Ferrous Review, v. 12, July-Sept. 1947, p. 58-60.
See item 14-240.

14-360. Magnesium Alloys—Small Calcium Additions. Marvin E. Gantz. *Aluminium and the Non-Ferrous Review,* v. 12, July-Sept. 1947, p. 61-65.
See item 14-98.

14-361. Mass Production Methods Applied to the Manufacture of Cast Steel Bomb Bodies. Percy H. Wilson. *Foundry Trade Journal,* v. 83, Oct. 23, 1947, p. 149-155; Oct. 30, 1947, p. 177-180; Nov. 6, 1947, p. 197-203; Nov. 13, 1947, p. 219-221; discussion, p. 221-224.
The first instance of the successful production of steel in side-blown converters from metal consisting entirely of cupola-melted steel scrap. A highly mechanized steel foundry mass-produces 500-lb. bomb bodies in green sand molds, the various operations being integrated to give a steady production of 100 castings per hr.

14-362. The Experimental Foundry at the Bureau of Mines. J. E. Rehder. *Canadian Metals & Metallurgical Industries,* v. 10, Nov. 1947, p. 14-16.
Activities, types of work done, and policy of the foundry of the Canadian Bureau of Mines.

14-363. Continuous Casting of Alloys Made Possible by New Process. *Product Engineering,* v. 18, Dec. 1947, p. 148.
M. W. Kellogg Co.'s electric-ingot method for continuous metal casting. Alloying elements are continuously fed at a controlled rate into an electrical apparatus from which air is excluded, and in which an ingot of any desired analysis is produced by progressive solidification. Superiority and uniformity of properties are claimed.

14-364. Factors Which Influence Surface Quality of Zinc-Base Die Castings. A. W. Sundwick. *Machine and Tool Blue Book,* v. 43, Dec. 1947, p. 143-146, 148, 150-152, 154-155.
Causes of surface defects in die castings and methods of safeguarding against these defects.

14-365. Electromagnetic Pumping of Molten Metals. Mario Tama. *Iron Age,* v. 160, Dec. 4, 1947, p. 68-70.
A new, nonmechanical method for pumping molten metals of high melting point, used in conjunction with the induction melting furnace, appears to offer new and improved techniques for permanent mold and die-casting operations. Flow is controlled by variations of induced current, while volume of metal pumped is determined by duration and rate of discharge.

14-366. Effect of Alloy Composition on Surface Quality of Die Castings. A. W. Sundwick. *Iron Age,* v. 160, Dec. 4, 1947, p. 71-74.
Explains the value of close composition control by citing the influence of variations of the various elements on castability of the alloy. Fluidity and solidification-range tests used at General Motors Corp. as shop-control devices.

14-367. Aluminum Alloy Castings. Floyd A. Lewis. *Foundry,* v. 75, Dec. 1947, p. 74-77, 186-188, 190.
History of aluminum and the development of various alloy compositions. (To be continued.)

14-368. Novel Toggle Mechanism Actuates, Locks Platen in Die Casting Machine. *Machine Design,* v. 19, Dec. 1947, p. 153-154.

14-369. Production Sand Casting. Martin Schacht. *Western Machinery and Steel World,* v. 38, Dec. 1947, p. 80-82.
Methods and equipment used at Fresno Brass Works, Fresno, Calif.

14-370. Machine Tools in Production Die Casting. *Western Machinery and Steel World,* v. 38, Dec. 1947, p. 94-97.
Equipment and methods of Yoder Mfg. Co., Los Angeles.

14-371. How to Make Die Castings. James Van Voast. *American Machinist,* v. 91, Dec. 4, 1947, p. 103-118.
What is die casting? How die-casting machines work; die construction and operation; how to design dies; how to select alloys; die-casting production control.

14-372. Applications of Precision Castings. R. H. Osbrink. *Automotive Industries,* v. 97, Dec. 15, 1947, p. 38-40, 62, 64.
Potentialities of natural-bonded sand casting; precision sand casting—the Osbring process; synthetic-bonded, baked, precision sand casting; Antioch or plaster-molded casting; the lost-wax process; permanent-mold casting; die casting; centrifugal casting; and vacuum-poured castings.

14-373. Fabrication au Cubilot de Cylindres de Laminoirs en Fonte Trempee. (Cupola Manufacture of Rolling-Mill Cylinders of Tempered Cast Iron.) Henry Dubois and Guy Henon. *Fonderie,* no. 21, Sept. 1947, p. 787-797.
The manufacture of a particular roll, covering tools and equipment used, composition of the cast iron, casting, machining, general principles to be observed, and the usual defects found in such cylinders.

14-374. Vormproblemen in de Metaalgieterij. (Casting Problems in the Metal Foundry.) A. Swagerman. *Metalen,* v. 2, Oct. 1947, p. 32-34.
Problems of the nonferrous foundry. Effect of gas absorption from the mold and core sands used; the effects of improper gating and risering.

14-375. Forgings for Many Industries. C. W. Gibbs. *Compressed Air Magazine,* v. 52, Dec. 1947, p. 294-297.
Equipment and procedures at Cornell Forge Co., Chicago, in manufacture of miscellaneous small iron items.

14-376. Magnesium-Alloy Doors. R. W. Eade. *Aircraft Production,* v. 9, Dec. 1947, p. 466-469.
Production of large castings for pressure-tight doors used in aircraft.

14-377. Solidification of Metals. Harry Schwartz. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 1-35.
Previously annotated in R.M.L., v. 2, 1945.

14-378. A Study of Molding Methods for Sound Castings. Frederick G. Sefing. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 36-42.
Presented at 42nd Annual Conference, Institute of British Foundrymen, London, June 15-16, 1945. Previously annotated in R.M.L., v. 2, 1945.

14-379. Cast Iron Foundry Practice; United States Wartime Developments. James S. Vanick. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 43-53.
Official A.F.A. exchange paper presented before the French Foundry Technical Association, Paris, Oct. 19-20, 1945. Previously annotated in R.M.L., v. 2, 1945.

14-380. Cause and Control of Magnesium Alloy Microporosity. E. A. G. Liddiard. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 54-65.
Twenty-fourth annual exchange paper—1922-1945—from Institute of British Foundrymen to the American Foundrymen's Association. Previously annotated in R.M.L., v. 2, 1945.

14-381. Use of the Cumulative Curve for Foundry Sand Control. R. E. Morey and H. F. Taylor. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 66-76.
Previously annotated in R.M.L., v. 2, 1945.

14-382. Studies on Solidification of Castings. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 90-101.
Introduction plus two papers: Methods Employed to Obtain Rates of Solidification, by K. L. Clark; Studies on Solidification of Castings, by Victor Paschkis. 14 ref. Previously annotated in R.M.L., v. 3, 1946.

14-383. Sand Reclamation. Ronald Webster and A. C. Den Breejen. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 131-139.

14-384. The Influence of Radiation Within Molding Sand on the Freezing Rate of Metals. H. A. Schwartz. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 159-162.
Previously annotated in R.M.L., v. 2, 1945.

14-385. Patterns in the Jobbing Foundry. W. C. Manwell. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 168-174.
Previously annotated in R.M.L., v. 3, 1946.

14-386. High-Temperature Sand Testing; Fifth Annual Progress Report. D. C. Williams. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 175-179.
Previously annotated in R.M.L., v. 3, 1946.

14-387. Reduction of Microporosity in Magnesium Alloy Castings. James De Haven, James A. Davis, and L. W. Eastwood. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 180-189.
Previously annotated in R.M.L., v. 2, 1945.

14-388. Molding Sand Properties at Elevated Temperatures. L. A. Kleber and H. W. Meyer. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 200-207.
Previously annotated in R.M.L., v. 2, 1945.

14-389. Aluminum Casting Stability. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 217-221.

14-390. Malleable Iron Control. M. E. McKinney. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 229-240.
Previously annotated in R.M.L., v. 2, 1945.

14-391. Equipment Trends in Precision Casting. A. J. Dore. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 241-247.

14-392. Split Type Specimen Tube for Elevated Temperature Sand Testing. D. C. Williams. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 248-252.
Previously annotated in R.M.L., v. 2, 1945.

14-393. Describes Improved Methods in Making Match Plates of Plaster Composition. C. C. Brisbois. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 258-263.
Previously annotated in R.M.L., v. 2, 1945.

14-394. Malleable Sand Control; Summary of Questionnaire. *Transactions of*

the American Foundrymen's Association, v. 53, 1946, p. 266-270; discussion, p. 270-271.

14-395. Centrifugal Casting; Committee Studies Casting Methods. D. Basch. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 292-293.

14-396. Committee Report on the Foundry Sand Research Project. H. Ries. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 293.

14-397. Some Aspects of Green Deformation and Sand Toughness in Sand Control. Wm. G. Parker. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 296-300.
Previously annotated in R.M.L., v. 3, 1946.

14-398. Industrial Status of Precision Castings. W. A. Morey. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 313-318.
Previously annotated in R.M.L., v. 2, 1945.

14-399. Elevated Temperature Tests in Sand Control. Arnold Satz. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 319-323.
Previously annotated in R.M.L., v. 2, 1945.

14-400. Principles of Die Casting Magnesium Alloys. C. E. Nelson and R. C. Cornell. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 328-332.
Previously annotated in R.M.L., v. 2, 1945.

14-401. Sand Control in a Malleable Iron Foundry. Gordon Davis. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 336-338.
Previously annotated in R.M.L., v. 2, 1945.

14-402. Synthetic Sand in Nonferrous Foundries. N. J. Dunbeck. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 345-348.
Previously annotated in R.M.L., v. 2, 1945.

14-403. 1944-45 Sintering Test Report of the Committee on Sintering Test, Foundry Sand Research Project of A.F.A. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 377-378.

14-404. Density of Light Alloy Castings. M. W. Daugherty and L. W. Kempf. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 386-391.
Previously annotated in R.M.L., v. 2, 1945.

14-405. Malleable Sand Control in a Large Mechanized Foundry. Joseph J. Clark. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 398-405.
Previously annotated in R.M.L., v. 2, 1945.

14-406. Castings Should Always Be Qualified in the Foundry. O. O. Gammon. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 342-344.
Previously annotated in R.M.L., v. 2, 1945.

14-407. Pattern Redesign for Increased Production. Ernest C. Moorhead. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 349-351.
Previously annotated in R.M.L., v. 2, 1945.

14-408. Sand Supply to Molding Machines From Overhead Hoppers. N. C. Blythe. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. B1-B2; discussion, p. B2-B3.
Previously annotated in R.M.L., v. 3, 1946.

14-409. Duplex Pump Castings. R. H. Brown. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. B4-B14.
Previously annotated in R.M.L., v. 3, 1946.

14-410. Mass Production of Tank Wheels in Black-Heart Malleable. A. B. Bill and J. Peers. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. B15-B25; discussion, p. B25-B31.
Previously annotated in R.M.L., v. 3, 1946.

14-411. Cupola Operation. D. H. Young. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. B46-B50.
Previously annotated in R.M.L., v. 3, 1946.

14-412. Specification, Design and Production of Iron Castings for Vitreous Enameling. John W. Gardom. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. B71-B74; discussion, p. B74.
Previously annotated in R.M.L., v. 3, 1946.

14-413. The Application of Ethyl Silicate to Foundry Practice. Clifford Shaw. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. B99-B101; discussion, p. B101-B104.
Previously annotated in R.M.L., v. 3, 1946.

14-414. The Formation of Banded Structures in Horizontal Centrifugal Castings. H. O. Howson. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. B110-B118; discussion, p. B118-B121.
Previously annotated in R.M.L., v. 3, 1946.

14-415. The Production of "Grand Slam" Bomb Castings. Basil Gray. *Proceed-*

ings of the Institute of British Foundrymen, v. 39, 1945-1946, p. A136-A145; discussion, p. A145-A147.

Previously annotated in R.M.L., v. 3, 1946.

14-416. Determination of "Gas Content" of Sand Cores; Report of Subcommittee T.S. 13 of the Technical Council. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. A192-A-194.

14-417. Second Report on the Basic Cupola by Subcommittee T.S. 10 of the Technical Council. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. A195-A198.

14-418. Superheating of Magnesium Alloys. N. Tiner. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 242-260; discussion, p. 261-264.

Previously annotated from *Metals Technology,* Oct. 1945, T.P. 1935, in R.M.L., v. 2, 1945.

SECTION XV

SCRAP AND BYPRODUCT UTILIZATION

15-1. Scrap Recovery. F. F. Poland. *Metal Industry,* v. 69, Dec. 6, 1946, p. 466-467, 470.

Zinc distillation and the refining of copper-base alloys.

15-2. Ford Reorganizes Salvage Department Due to Changed Conditions. Leonard Westrate. *Automotive and Aviation Industries,* v. 96, Jan. 1, 1947, p. 30-31, 54.

Organization of new system, which resulted from critical examination of costs. Tool salvage; scrap handling.

15-3. Distribution of Ferric Chloride Between Isopropyl Ether and HCl in Stainless Steel Salvaging Process. Ralph McCormack and Frank C. Vilbrandt. *Virginia Polytechnic Institute Engineering Experiment Station Series No. 64,* Sept. 1946, 8 p.

A practical process for production of nickel and chromium salts from stainless steel scrap produced as turnings in small machine shops. The solution of the turnings by HCl was facilitated by addition of $FeCl_3$ and heating. Isopropyl ether is used to extract the $FeCl_3$, hence the distribution study was made.

15-4. Scrap Salvaging. *Steel,* v. 120, Feb. 3, 1947, p. 118.

Sorting, storage and collection of metal scrap in a representative small plant. Recovery of waste oil by oil extractor.

15-5. Disposal of Cyanide Wastes. John G. Dobson. *Metal Finishing,* v. 45, Feb. 1947, p. 78-81.

Cyanide radical which has been found to be toxic to fish in concentrations as low as .025 parts per million can be successfully eliminated from the wastes resulting from plating, case hardening, and other industrial processes by the addition of approximately 4 parts per million of chlorine per part of CN at controlled pH's above 8.5. Toxicity of such cyanide wastes, the various methods of treatment which have been used, and the results of laboratory and plant-scale operations of both the lime-sulphur and chlorination methods.

15-6. Scrap Handling System Paid for Itself in Two Months. Edward F. Sharpe. *Factory Management and Maintenance,* v. 105, Feb. 1947, p. 84-85.

Modern mechanical handling equipment which shows continued savings in labor, money, and floor space.

15-7. Scrap Metals. Charles White Merrill, Herbert L. Cullen and Norwood B. Melcher. *Mining Congress Journal,* v. 33, Feb. 1947, p. 98-101.

1946 developments and 1947 trends.

15-8. Nassau—The Bell System's Conservation Specialist. William A. Scheuch. *Bell Telephone Magazine,* v. 25, Winter 1946-1947, p. 256-266.

The ways in which Nassau Smelting and Refining Co., a subsidiary of Western Electric Co., reclaims millions of pounds of metals and other materials from Bell system operations.

15-9. How Ford Salvages Waste. *Machine and Tool Blue Book,* v. 43, March 1947, p. 172-176, 178, 180.

Methods employed at the Ford Motor Co. to salvage rubber articles, drills, hammers, grinding wheels, paper and wooden blocks.

15-10. Making Useful Things From Scrap. G. A. Goener. *Railway Age,* v. 122, March 29, 1947, p. 657-659.

Methods used by the Chicago, Burlington & Quincy Railroad for reclamation of scrap materials.

15-11. Mexican Cement Plant Designed to Use Waste Slag From Nearby Steel Works. *Pit and Quarry,* v. 39, March 1947, p. 87-88.

A description of plant procedures.

15-12. Separating Metals From Dross. *Edgar Allen News,* v. 25, March 1947, p. 777-778.

A batch of material comprising dross and metallics is fed into machine. A charge of steel balls in the inner chamber separates metal from

dross by attrition. The mill consists of a hard steel cylinder having long slotted apertures which allow dross to leave this chamber after being separated from the metal by the action of the steel balls. It is suitable for metals such as silver, copper, brass, aluminum.

15-13. Handling Salvage at a Profit. *Flow,* v. 2, April 1947, p. 26-27.

Plant saves $5.00 to $9.00 per ton through an efficiently-engineered metal scrap-handling system.

15-14. Steel Firms Conserve Scrap by Using Heavier Charges of Iron Ore. *Iron Age,* v. 159, April 17, 1947, p. 104-105.

Table gives shipments of steel products, for 1946, and production of open-hearth, bessemer, and electric steel ingots and steel castings for 1946 and 1947.

15-15. German Practice in Refining Secondary Aluminum. James T. Kemp. *Metals Technology,* v. 14, April 1947, T. P. 2143, 14 p.

Some interesting and rather unusual processes for refining impure aluminum derived from scraps were found by American and British investigators.

15-16. Salvaging Oversized Parts by an Acid Etch. Donald A. Baker. *Machinery,* v. 52, May 1947, p. 166.

Corrective measures for three very expensive crankshafts that were 0.001 in. oversize on the splined end as the result of nitriding.

15-17. Waste Pickle Liquor. Richard D. Hoak. *Industrial and Engineering Chemistry,* v. 39, May 1947, p. 614-618.

The most important processes proposed for pickle-liquor treatment. Processes developed on a laboratory scale by the fellowship sustained at Mellon Institute by the American Iron and Steel Institute. No reasonably sound process is available for the treating of waste pickle liquor but research work now in progress indicates that this goal is in sight, but that a great deal of development work remains to be done.

15-18. Brass and Copper Industry. William S. Wise, Barnett F. Dodge, and Harding Bliss. *Industrial and Engineering Chemistry,* v. 39, May 1947, p. 632-636.

Brass and copper industry operations produce various wastes. Data on waste liquors from brass pickling. The treatment processes developed at Yale University and tested in a pilot plant. A few cost estimates. Two other proposed processes illustrated by flow diagrams.

15-19. Salvaging Iron Castings With Machinable Arc Welds. David W. DeArmand and Samuel Epstein. *Materials & Methods,* v. 25, May 1947, p. 68-72; *Western Machinery and Steel World,* v. 38, May 1947, p. 90-93.

How 45-lb. gray-iron pump casting, rejected because an area of the flange failed to fill during pouring, was salvaged.

15-20. Repair of Gray Iron Castings. C. E. Phillips. *Welding,* v. 15, May 1947, p. 227-229.

Procedures.

15-21. How to Reclaim Castings With Machinable Welds. David W. DeArmand and Samuel Epstein. *Industry and Welding,* v. 20, June 1947, p. 30-32.

Use of special flux-coated high-nickel-content electrodes.

15-22. Repair Procedures in a Production Weld Shop. Orlo E. Brown and Charles R. Causey. *Iron Age,* v. 159, June 19, 1947, p. 60-63.

Suggestions for setting up a system of work handling and for classifying types of repair work according to material. Repair of cast-iron parts; how to avoid cracking and distortion.

15-23. Furnace Converts Turnings Into Heavy Melting Stock. J. C. Sullivan. *Steel,* v. 120, June 23, 1947, p. 124, 127.

How turnings subjected to tumbling action under high temperature and controlled atmosphere are balled into compact mass.

15-24. Lime Treatment of Waste Pickle Liquor. C. J. Lewis. *Iron Age,* v. 159, June 26, 1947, p. 45-49.

Various factors which govern the selection of proper liming material, from the standpoint of chemical reactivity and economy. Methods of preparation and application to spent pickle liquor; several suggested techniques for sludge disposal.

15-25. Organization for Scrap Cutting. *Linde Tips,* v. 26, July 1947, p. 80-81.

Mechanized arrangement which saves time and labor.

15-26. Difficultes Rencontrees a L'Emploi d'Alliages Legers de Deuxieme Fusion Pour Coulee De Pieces en Coquilles. (Difficulties Encountered in the Use of Light Alloys for Casting.) Jean Duport. *Fonderie,* no. 14, Feb. 1947, p. 527-538.

Two specific cases of difficulties arising from the use of scrap light alloys in making small castings. Various types of scrap alloys, methods of control and treatment, and the properties of casting metals.

15-27. Steel Scrap Conversion. Hubert Swett. *Western Metals,* v. 5, July 1947, p. 16-18.

Some of the technical phases of converting steel scrap into finished steel. Why the steel industry has certain restrictions regarding scrap quality.

15-28. Gas Fluxing in Production of Secondary Aluminum. G. W. Birdsall. *Steel,* v. 121, Aug. 4, 1947, p. 88-89, 115-116, 120, 122, 124; Aug. 11, 1947, p. 86-88, 104-105.

Improved melting and refining practices in handling wide variety of aircraft body scrap with remarkably efficient recovery. Continuous gas fluxing with chlorine, combined with innovations in furnace practice, permits economical production of high-grade aluminum alloys that meet original impurity limitations of 17S or 24S. Methods for refining aluminum scrap, including a complete installation for utilizing liquid chlorine direct from tank cars.

15-29. Melting Aluminum Scrap in the Low Frequency Induction Furnace. Manuel Tama. *Iron Age,* v. 160, Sept. 4, 1947, p. 76-79.

A technique developed at Scovill Mfg. Co. resulted in an average recovery rate of 96%; the characteristics of oxide-coated particles and their effect on heat transfer in the furnace.

15-30. Reconditioning Heater Tubes at Gulf's Port Arthur Plant. R. B. Tuttle. *Oil and Gas Journal,* v. 46, Sept. 13, 1947, p. 90, 93.

Procedures and equipment used to recondition steel tubing retired from fired-heater oil-refinery service.

15-31. Treating Cyanide Waste From Metalworking Plants. *Steel,* v. 121, Sept. 15, 1947, p. 93, 112, 114, 117.

Use of chlorine for oxidation of cyanide waste.

15-32. How to Recondition Worn Shafts and Rods. *Power,* v. 91, Aug. 1947, p. 124.

Procedures involving lathe dressing, welding, metal spraying, and removal of excess metal.

15-33. Reclamation in a Primary Smelter of Copper From Brass Shell Cases. W. B. Boggs. *Canadian Institute of Mining and Metallurgy Transactions* (bound with *Canadian Mining and Metallurgical Bulletin*), v. 50, Aug. 1947, p. 445-447.

Difficulties encountered in a primary smelter which was not designed to treat scrap metals.

15-34. Profitable Impalpable. *Industrial and Engineering Chemistry,* v. 39, Sept. 1947, p. 8A, 10A, 14A, 16A.

Acid-solution process recently brought into production for converting machine-shop steel scrap into high-purity powdered iron.

15-35. Reclaiming a Broken 54-In. Mill Pinion. Warren W. Scherer. *Iron and Steel Engineer,* v. 24, Sept. 1947, p. 58-61; discussion, p. 61.

Methods used. (Presented at A.I.S.E. Pittsburgh District Section Meeting, April 14, 1947.)

15-36. Purification of Aluminum and Its Alloys. Yves Dardel. *Metals Technology,* v. 14, Sept. 1947, T.P. 2247, 20 p.

A critical discussion of the literature on the remelting and purification of aluminum scrap. States that most of the papers on the subject have no scientific value because of the use of theories opposed to fundamental laws of physical chemistry. Therefore, a general theory is developed for the different basic processes used. Under "elimination of dissolved hydrogen", 9 elementary processes are discussed; and under "removal of insoluble impurities", 4 methods are evaluated. Actual commercial methods are much more numerous, but consist of different combinations of the steps discussed. 57 ref.

15-37. Smelting and Refining of Reclaimed Nonferrous Metals. A. E. St. John. *Metal Progress,* v. 52, Oct 1947, p 609-612.

Equipment and procedures used by Federated Metals Division, American Smelting and Refining Co.

15-38. A Mechanical Method for Machine Repair. T. O. Oliver, Jr. *Iron and Steel Engineer,* v. 24, Sept. 1947, p. 55-57; discussion, p. 57-58.

New method for repairing castings which enables repairs to be made without distortion and without patches. Specially formed locks or keys are used to splice the cracks. Slots are cut transverse to the fracture and the locks are inlaid by cold working into the parent metal. At points of high stress concentration, an inlay of high-strength alloy plates may be used. These are held in place by dowels cold worked into matching half holes between the parent metal and the lock. (Presented at A.I.S.E. Buffalo District Section Meeting, April 9, 1946.)

15-39. Scrap Reduction Gains Recognition. James K. Matter. *American Machinist,* v. 91, Oct. 9, 1947, p. 114-115.

Cost reduction through scrap reduction.

15-40. Weld Repair of Gray Iron Castings. C. E. Phillips. *Iron Age,* v. 160, Oct. 23, 1947, p. 49-51.

How to produce fully machinable welds in the above. Types of electrodes best suited for this type of work and the techniques necessary to avoid excessive hardness and breakdown of edges or corners.

15-41. Nonferrous Metals; Influence in Scrap for Steelmaking. Edmund R. Thews. *Iron and Steel,* v. 20, Oct. 1947, p. 479-480.

Costs of scrap sorting and effects of specific metallic and nonmetallic impurities.

15-42. Waste Pickle Conversion to New Material. William Bull. *Chemical Age,* v. 57, Oct. 4, 1947, p. 465-466.

Applicability to British practice of a sulphuric (or hydrochloric) acid pickle-liquor disposal method developed recently in the U. S. A cellular, insulating, building-construction material known as "Ferron" is produced. The method is in commercial operation in the plant of the Sharon Steel Corp., Sharon, Pa.

15-43. Zinc Oxide From Brass Scrap. A G. Arend. *Paint Technology,* v. 12, Sept. 1947, p. 329.

A process operated in the Glasgow district several years ago, in which the oxide was accumulated as a light fluff instead of passing off as fume.

15-44. Utilisation des Tournures de Fonte dans un Four Rotatif. (Use of Cast Iron Turnings in a Rotating Furnace.) Henry Gernelle. *Fonderie,* Aug. 1947, p. 772-775.

The "foliated" appearance of cast iron in which turnings have been used. Various remedies and precautions to be taken.

15-45. New Data Concerning Straightening of Welded Aircraft Structures. A. Ia. Brodskii. *Avtogennoe Delo (Welding),* Aug. 1947, p. 14-19. (In Russian.)

Precautions necessary in straightening welded structures by localized heating. A formula for determining the buckling point of cold straightened, tubular specimens. Effects of various factors.

15-46. Cold Repair of Broken Castings. *Engineer,* v. 184, Oct. 24, 1947, p. 395.

System described consists of driving a number of specially shaped key elements into the metal transversely across the crack or rupture and then sealing them in position by cold working. These elements are made of a series of high-nickel alloys, including metals having a selective range of thermal-expansion coefficients. The type of element is selected according to the requirements of the part to be repaired.

15-47. Single-Slag Heats. M. J. Meinen. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 109-110; discussion, p. 113-122.

Experience with 17 heats of S.A.E. 4140 steel using a charge of 50% heavy and 30% medium-heavy Cr-Mo scrap, and balance light plate scrap.

15-48. Possibility of Use of Grinding Dust in Making Stainless Steel. M. J. Meinen. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 136-137.

Use of grinding dust in the electric furnace. Metallic recovery from this otherwise wasted material was about 70%.

15-49. Metal Spray Practice in Steel Plants. A. E. Cichelli. *Iron and Steel Engineer,* v. 24, Dec. 1947, p. 35-42; discussion, p. 43-47.

Procedures and applications in the repair of worn parts. (Presented at A.I.S.E. Philadelphia District Section Meeting, Feb. 1, 1947.)

15-50. Steel Castings; Repair Methods. J. F. Cotton. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 307-312.

Previously annotated in R.M.L., v. 2, 1945.

SECTION XVI

FURNACES AND HEATING DEVICES

16-1. Enameled Screen Gives Best Results in Screening Coke Breeze and Damp Materials. Fred J. Geyer. *Blast Furnace and Steel Plant,* v. 34, Dec. 1946, p. 1529-1530.

Difficulty with clogging was experienced in screening $+\frac{3}{16}$ to $+\frac{5}{8}$-in. coke breeze. Several methods for alleviating the difficulty were tried without success. Finally, application of an enamel coating solved the problem. Useful for screening any damp material.

16-2. Continuous Heating and Heat Treatment of Bar Stock and Tubing. Frederic O. Hess. *Industrial Gas,* v. 25, Dec. 1946, p. 10-11, 25-26.

Continuous heat treating furnace setup for use in the reheating operation required before final tube sizing in the seamless tube mills. Substitution of continuous for batch methods eliminates surface decarburization.

16-3. The Rotating Electric Arc Furnace. T. Ellefsen. *Engineers' Digest,* v. 3, Nov. 1946, p. 570.

Crater formation in the electric arc furnace is eliminated by a rotating furnace with stationary electrodes in use in Norway. Construction details. Six-month tests resulted in 17% increased production and 10% saving in charge material. It has been used only for iron alloys, but is recommended for calcium carbide and other materials; suggested for controlled atmosphere smelting. (Condensed from *Journal du Four Electrique et des Industries Electrochimiques,* v. 55, June-July 1946, p. 41-44.)

16-4. The Case for Oil Firing. F. J. Erroll. *British Steelmaker,* v. 12, Dec. 1946, p. 598-600.

Pros and cons of fuel oil for British iron and steel furnaces. Change-over is facilitated by recent repeal of import tariff.

16-5. Liquid Fuel for Openhearth Furnaces. G. Reginald Bashforth. *British Steelmaker,* v. 12, Dec. 1946, p. 602-614.

Fundamentals of heat transfer; use of tar; characteristics and properties of fuel oil; advantages and disadvantages; supply and storage; oil flow; atomization; burners and burner design; furnace control; furnace design; future British prospects for use of liquid fuel.

16-6. Les Fours Rotatifs de Fusion. (Rotary Smelting Furnaces.) Paul Blanchard. *Fonderie,* Oct. 9, 1946, p. 323-334.

Basic types of rotary smelting furnaces. Advantages and disadvantages of each type compared with stationary furnaces.

16-7. The Calculation of Nickel-Chromium Resistors in Heat Treating Furnaces. Victor Paschkis. *Industrial Heating,* v. 13, Dec. 1946, p. 1972, 1974, 1976, 1978, 1980, 1982, 1984, 1986, 1988.

Mathematics concerned in the calculation of nickel-chromium resistors for electric heat treating furnaces.

16-8. Continuous Furnaces Feature Equipment of Plant of Columbia Steel Treating Co. Part II. *Industrial Heating,* v. 13, Dec. 1946, p. 2048, 2050, 2052.

Box-type furnaces, salt-bath cyaniding furnaces, fuel-oil and quenching oil handling and storage systems.

16-9. New Methods in Steel Axles. *Western Machinery and Steel World,* v. 37, Dec. 1946, p. 120-123.

Continuous rotary-hearth heating furnace, a number of gas-fired pits for control cooling of finished forgings, an axle straightener of novel design and a number of minor auxiliaries.

16-10. Electronic Heating Requirements. A. P. Bock. *Electronics,* v. 20, Jan. 1947, p. 126.

Charts make it possible to determine amount of power required for a given heating job. Curves are given for nine common materials, and the chart can be used for any other material if its specific heat is known.

16-11. Den Elektriska Stälugnens Utveckling under Världskriget 1939-1945.

(Development of the Electric Steel Furnace During the World War 1939-1945.) Erik Sunstrom. *Jernkontorets Annaler,* v. 130, no. 10, 1946, p. 477-552.

Review illustrated by charts, photographs, and diagrams includes auxiliary equipment and refractory materials. Developments, not only in Sweden, but also in the other important steel-producing countries. 34 ref.

16-12. Recirculation as Applied to Heating and Cooling on Industrial Ovens. Richard J. Ruff. *Industrial Gas,* v. 25, Jan. 1947, p. 9-10, 26-27.

Curves show comparative heating rates of aluminum wire in still air and in recirculated air. Advantages and applications of the system.

16-13. Simplified Calculation of Radiation From Nonluminous Furnace Gases. W. Trinks. *Industrial Heating,* v. 14, Jan. 1947, p. 40, 42, 44, 46.

The comparatively simple method of calculating the heat transfer from such gases published during the war by Schwiedessen. ("Die Strahlung von Kohlensaure und Wasserdampf" *Archiv für das Eisenhüttenwesen;* October 1940.)

16-14. Economic and Practical Aspects of Electric Hoists for Operating Industrial Furnace Doors. Fred J. Ryan. *Industrial Heating,* v. 14, Jan 1947, p. 48-50, 52, 54.

Advantages of electric door lift and cost comparison with manually operated type.

16-15. Modern Plant Operated by General Heat Treating Co. in Cleveland. *Industrial Heating,* v. 14, Jan. 1947, p. 130-132, 134, 136, 138.

Discussion confined to furnaces.

16-16. The Use of Box-Type Furnaces for Tools. E. F. Watson. *Machinery (London),* v. 69, Dec. 26, 1946, p. 818-819.

Location of heating units in various box type furnaces. Various atmospheres used now and in the past and application of each.

16-17. Heat Treatment. *Automobile Engineer,* v. 36 Dec. 1946, p. 573-582.

Various types of G.W.B. equipment for charging, discharging and quenching furnace loads. An interesting and compact unit for generating a burnt town gas atmosphere is included.

16-18. Oil Firing. G. Reginald Bashforth. *Iron and Steel,* v. 20, Jan. 1947, p. 3-8.

Supply and storage; advantages and disadvantages of oil fuel; heat transfer; characteristics and properties of oil fuel; atomization; burner design; oil and steam flows, as applied to the iron and steel industry.

16-19. Output Increased, Maintenance Reduced in New High-Temperature Furnace. John D. Knox. *Steel,* v. 120, Feb. 3. 1947, p. 99, 122, 124.

Silicon carbide heating tubes and hearth rollers operate at 2500° F. High fuel efficiency obtained. Tubes long in experimental service show no signs of deterioration. Heavy roller loads conveyed through furnace either in batches, by indexing or continuously.

16-20. The Graphite Rod Melting Furnace and Its Many Uses in Foundries. *Brown Boveri Review,* v. 33, April-May 1946, p. 112-114.

It is particularly suitable for foundries where different metals, such as cast iron, aluminum, copper, and copper-nickel alloys are melted in turn.

16-21. Induction and Dielectric Heating. Kennard Pinder. *Electrical Engineering,* v. 66, Feb. 1947, p. 149-160.

Fundamental principles of induction and dielectric heating; various general types of operations utilizing dielectric heating; data on types and sizes of units required.

16-22. Crucible Furnaces. J. G. McDonnell. *Metal Industry,* v. 70, Jan. 31, 1947, p. 83-85.

Lift-out furnaces and tilting furnaces. (To be continued.) (Paper presented to the Slough Branch of the Institute of British Foundrymen.)

16-23. The Use of Heat Baffles on Conveyers of Continuous Furnaces. R. R. Sherrill. *Enamelist,* v. 24, Feb. 1947, p. 11-13, 48-49.

Failure of the hot-zone bottom piers of a new continuous furnace, after three months of operation on Porcelain enameling of stove parts; the use of heat baffles.

16-24. Les Fours Rotatifs de Fusion. (Rotating Melting Furnaces.) (Concluded.) Paul Blanchard. *Fonderie,* no. 10, Nov. 1946, p. 365-374.

Various fuels and refractories used in these furnaces.

16-25. Heat Treating Aircraft Engine Parts at Pratt & Whitney Kansas City Plant. Part I. *Industrial Heating,* v. 14, Feb. 1947, p. 204-208, 210.

Design of furnaces in use. (To be continued.)

16-26. Crucible Furnaces. (Continued.) J. G. McDonnell. *Metal Industry,* v. 70, Feb. 7, 1947, p. 103-105.

A power-tilted lip axis furnace and a crucible furnace on the same principle as the open-flame "concrete mixer" type of rotary furnace. (To be concluded.)

16-27. Improved Design of Metallic Recuperator. Frank D. Hazen. *Iron and Steel Engineer,* v. 24, Feb. 1947, p. 59-63; discussion, p. 63-64.

Design and advantages of metallic recuperators for industrial furnaces such as for slab and billet heating.

16-28. How to Use Less Coke. *Foundry,* v 75, March 1947, p. 78-80, 232, 234.

Four letters received in answer to an invitation to readers to submit recommendations for most economical use of cupola fuel.

16-29. The Operation of Openhearth Furnaces With Coke-Oven Gas. D. Kilby. *Journal of the Iron and Steel Institute,* v. 155, Jan. 1947, p. 3-20.

Operation of English 100-ton basic openhearth furnaces at a certain plant, which are fired with coke-oven gas and pitch creosote.

16-30. The Blast Furnace of Today. Part I. A Review of Current Furnace Engineering. W. R. Brown. *Journal of the Iron and Steel Institute,* v. 155, Jan. 1947, p. 107-115.

Developments which have led to the British blast furnace of today. Photographs and illustrations.

16-31. The Blast Furnace of Today. Part II. A Commentary on Current Furnace Engineering. I. S. Scott-Maxwell. *Journal of the Iron and Steel Institute,* v. 155, Jan. 1947, p. 115-120.

Layout and economic operation; material handling and preparation; furnace stack and top gear; auxiliaries.

16-32. Liquid Fuel. C. Croxford. *Iron and Steel,* v. 20, Feb. 1947, p. 49-53.

Disadvantages of gas firing; the use of liquid fuels, with or without gas; the advantages of liquid fuels; training of men; supply of fuel to the furnaces. (To be concluded.)

16-33. The Infrared Gas Burner. L. Sanderson. *Metallurgia,* v. 35, Feb. 1947, p. 187-189.

A recent development in gas burners of the infrared type. One of the latest types of these burners has a refractory surface, which is kept brilliantly radiant from which a uniform temperature is obtained. Constructional principles involved.

16-34. The Use of Low-Frequency Electric Induction Furnace for the Melting of Aluminum Alloys. S. Boxall. *Metallurgia,* v. 35, Feb. 1947, p. 205-206.

Advantages and disadvantages of melting aluminum alloys in the low-frequency induction furnace. There are no products of combustion; thus, hydrogen, which is present in fuel gases, is not likely to contaminate the charge. The rotary motion imported by the furnace reduces the possibility of segregation, and the temperature can be controlled within fine limits. In addition, the furnace is clean in operation, and melting losses are low.

16-35. Enameling Furnaces Increase Production in St. Louis Stove Plant. Robert Latimer. *Industrial Gas,* v. 25, Feb. 1947, p. 18, 22.

Furnaces and enameling techniques used by American Stove Co. in St. Louis.

16-36. Heating With Microwaves. J. Marcum and T. P. Kinn. *Electronics,* v. 20, March 1947, p. 82-85.

Methods of utilizing wave guides for applying microwave energy to moving or stationary wires and threads, sheets, or irregularly shaped objects to achieve uniform dielectric heating; tubes offering possibilities for continuous operation.

16-37. New Developments in Heat Processing Equipment. F. G. Daveler. *Gas Age,* v. 99, March 20, 1947, p. 21-24, 60, 62.

Controlled atmosphere producing equipment, accelerated drying ovens for paints, high-speed aluminum annealing, and glass-dropping kilns.

16-38. Electronic Heating Units Show Economy, Speed. *Electronic Industries & Electronic Instrumentation,* v. 1, March 1947, p. 2-3.

The factors involved in deciding on electronic heating for different applications.

16-39. Induction Melting Furnaces. Frank T. Chesnut. *American Foundryman,* v. 11, March 1947, p. 22-25.

Use of an electric induction furnace is justified where the metal to be melted is of a critical analysis, where its quality must be kept high or where flexibility and working conditions are important considerations. The furnace to be used should be determined by the economics of a particular set of conditions, including the stand-by charge for power, the kind and volume of metal to be melted, the length of the working day, and the life of the refractories involved in the operation.

16-40. New Homestead Openhearths Feature Highly Automatic Control. Robert Urquhart. *Iron Age,* v. 159, April 3, 1947, p. 46-52.

Outstanding automatic features; furnace construction; plant layout.

16-41. Heat Treating Aircraft Engine Parts at Pratt & Whitney Kansas City Plant. Part II. *Industrial Heating,* v. 14, March 1947, p. 386-388, 390, 392.

Box-type hardening furnaces especially designed for hardening propeller shafts; a continuous draw furnace for the hardened shafts; a conveyer-type brazing furnace.

16-42. Openhearth Steel Furnaces. W. F. Cartwright. *Institute of Petroleum Review* (Supplement), Jan. 1947, p. 31-32.

Advantages of fuel oil for openhearth furnaces.

16-43. Ferrous Metals. A. Stirling. *Institute of Petroleum Review* (Supplement), Jan. 1947, p. 32-33.

Advantages of fuel-oil firing for batch and continuous-type reheating furnaces.

16-44. **Nonferrous Metals.** J. Sykes. *Institute of Petroleum Review* (Supplement), Jan. 1947, p. 33-34.
Advantages of fuel-oil firing in smelting, refining, melting, casting, and annealing.

16-45. **Fornos de Inducao. (Induction Furnaces.)** Olavo Egydio Setubal. *Boletim da Associacao Brasileira de Metais,* v. 3, Jan. 1947, p. 143-155; discussion, p. 155-156.
Different types of induction furnaces with reference to method of operation, capacity, and type of current used. Losses, frequencies for different types of charges, and refractories used. 15 ref.

16-46. **Fornos de Inducao e Suas Aplicacoes na Industria Metalurgica. (Induction Furnaces and Their Applications in the Metal Industry.)** P. G. Paula Leite. *Boletim da Associacao Brasileira de Metais,* v. 3, Jan. 1947, p. 157-174.
Operation and applications. 18 ref.

16-47. **O Forno "Elkem" de Sola Rotativa Para Processos Eletrotermicos. (The "Elkem" Furnace With Rotating Base for Electrothermic Processes.)** T. Ellefsen. *Boletim da Associacao Brasileira de Metais,* v. 3, Jan. 1947, p. 175-184.
The "Elkem" type of electric furnace, for the production of ferroalloys and calcium carbonate, aids in avoiding the sintering of the charge around the electrodes. The modification described is claimed to assure perfect operation to increase the capacity and to decrease the consumption of raw materials.

16-48. **Furnaces for Steelmaking.** J. H. Chesters and M. W. Thring. *Journal of the Institute of Fuel,* v. 20, Feb. 1947, p. 77-90.
The development of regenerative furnaces; the thermodynamics of steelmaking; heat transfer in the Siemens furnace, measurement and control of furnace input, and the inner working of the furnace. Under the latter are included: measurement of total heat flow; subdivision of flame radiation into the effects of flame emissivity and flame temperature with the narrow-angle radiometer; the effect of water-cooling in heat flow inside the furnace; and effect of different port designs on flame shapes. (Based largely on the work reported more fully in Iron and Steel Institute Special Report No. 37.)

16-49. **Liquid Fuel.** C. Croxford. *Iron and Steel,* v. 20, March 1947, p. 83-87.
The advantages of liquid fuel firing compared with gas, and some of the snags likely to be met.

16-50. **Symposium on Soaking-Pit Operation. Part I.** *Industrial Heating,* v. 14, April 1947, p. 602-604, 686.
Review of symposium on soaking-pit operation featuring discussion of equipment and methods in existing plants.

16-51. **Ferrous and Nonferrous Metals Treated in Commercial Steel Treating Co. Plant. Part I.** *Industrial Heating,* v. 14, April 1947, p. 652, 654, 656, 658.
Continuous pusher-type heat treating furnace; electric salt bath furnace; reciprocating-hearth continuous hardening furnace; rotary-retort gas carburizing furnace. (To be continued.)

16-52. **The What and How of Radio-Frequency Heating.** B. E. Rector. *Tool Engineer,* v. 18, April 1947, p. 18-21.
Basic principles of induction and dielectric heating.

16-53. **Oxides Renew Electrodes in Electric Furnace.** *Tool Engineer,* v. 18, April 1947, p. 32.
How oxides which form in the salt bath from three sources (contact with atmosphere at the surface, from the work itself, and from the electrodes) are employed to self-perpetuate the electrodes. Oxides circulating through bath contact graphite rod and are reduced to metallic scale. As carbon content increases, the melting point of scale is decreased. Scale forms in droplets and falls on, and becomes integral part of, electrode when carbon content of droplet is reduced.

16-54. **Economy in Electric Arc Furnace Operation.** T. Starling Winters. *Steel,* v. 120, April 14, 1947, p. 108-110, 113.
How new automatic regulator controls kw. maximum demand of electric-arc furnaces by supervising movement of furnace electrodes. Employment of a new heat-proof circuit insures cooperation of melters.

16-55. **Essential Considerations in Furnace Usage and Design.** Herbert Southern. *Metallurgia,* v. 35, March 1947, p. 227-232.
The influence upon fuel consumption of the characteristics of a furnace and of the factors inherent to the heating process. A mathematical approach by which thermal characteristics can be predicted with a maximum degree of accuracy.

16-56. **The Infrared Gas Burner.** L. Sanderson. *Metallurgia,* v. 35, March 1947, p. 239-240.
Some examples of actual infrared burner applications show how widely this process can be adopted industrially.

16-57. **Self-Coking Electrodes for Arc Furnaces.** L. I. Levy. *Engineers' Digest*

(American Edition), v. 4, April 1947, p. 158.

Three types of electrodes developed in Russia during the war which do not require a preliminary baking or coking process and the method for their production, installation, and use. (Condensed from *Vestnik Mashinostroenia*, no. 1, 1946, p. 41-45.)

16-58. Mercury-Arc Frequency Changing Equipment for Induction Heating. S. R. Durand. *Iron and Steel Engineer*, v. 24, April 1947, p. 102-108; discussion, p. 108-110.

The principles of the mercury-arc converter, especially as applied to induction heating. Advantages and limitations for induction hardening, melting, and forging.

16-59. Foundries and Forge Shops Reduce Heat Treating Costs. Kenneth Rose. *Materials & Methods*, v. 25, April 1947, p. 100-102.

Comprehensive studies made by three Milwaukee plants of the gains made by installation of high production furnaces.

16-60. Controlled Furnace Atmospheres. Part II. A. G. Hotchkiss. *Steel Processing*, v. 33, April 1947, p. 240-242.

Two hot charcoal converter methods and another type of converter employing endothermic reaction where air-gas mixtures of very low ratio are completely reacted over a catalyst which is externally heated. Relatively simple setup of this type of equipment. Analysis, cost of production, and applications of various atmospheres.

16-61. An Experimental Furnace for the Investigation of Openhearth-Furnace Combustion Problems. Part I. Description of Plant. A. H. Leckie, J. R. Hall, and C. Cartlidge. **Part II. The Effects of Gas Rate, Port Size, Air Gas Ratio, Furnace Pressure, and Gas Calorific Value.** A. H. Leckie, J. F. Allen, and G. Fenton. *Journal of the Iron and Steel Institute*, v. 155, March 1947, p. 392-422.

An experimental furnace specially designed for the investigation of some of the variables affecting openhearth-furnace fuel efficiency and rate of melting. Serious experimental difficulties associated with operation at melting temperatures have been avoided by conducting the experiments at a lower temperature, the heat transferred to the hearth being measured by calorimeters. The effects of gas rate, port size, air-gas ratio, furnace pressure, and gas calorific value in the experimental furnace. Some of the factors governing correct port design, in particular the relative areas of air and gas ports, are investigated.

16-62. Blowing-Out a Blast Furnace. R. Fowler. *Journal of the Iron and Steel Institute*, v. 155, April 1947, p. 513-518.

General considerations and blowing-on procedures. The method adopted at the Ebbw Vale plant of Messrs. Richard Thomas and Baldwins, Ltd. The blowing-out of No. 3 blast furnace at the works of The Park Gate Iron and Steel Co., Ltd., Rotherham, is described by J. W. Houghton in an appendix.

16-63. The Operation of Openhearth Furnaces With Coke-Oven Gas. D. Kilby. *Blast Furnace and Steel Plant*, v. 35, May 1947, p. 563-570.

British author feels that the straight coke-oven-gas-plus-illuminant method of firing is deserving of greater consideration under today's conditions. A detailed description of furnace design for use of coke-oven gas and pitch-creosote mixtures, including a number of detail diagrams, one of which is of a combined pitch-creosote and gas burner, and pitch-creosote atomizer. (To be continued.)

16-64. Oxygen Enriched Blast. Kurt Neustaetter. *Steel*, v. 120, May 19, 1947, p. 110, 112, 133.

Known facts concerning prospects of increasing oxygen content of air blown into the blast furnace. Theory, German experimental runs, and meager and vague information that has come out of Russia.

16-65. Comparison of Furnaces With One Checker and Two Checkers. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.*, v. 29, 1946, p. 41-44.

L. A. Lambing of Jones & Laughlin prefers single checkers. H. L. Allen of Republic prefers two-checker construction. Supporting data are given.

16-66. Labor-Saving Devices in the Openhearth. B. D. McCarthy. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.*, v. 29, 1946, p. 68-71.

Improved methods for slag removal, removal of flue dust, cleaning pits, materials handling, and other short cuts.

16-67. Labor-Saving Devices Used at Bethlehem Steel Company. T. A. Lewis. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.*, v. 29, 1946, p. 72-78.

Loading machine for removal of debris, vacuum system for cleaning flues, materials-handling systems, a checker-cleaning machine, and other arrangements used during rebuilding of openhearths.

16-68. Cleaning Checkers and Flues. Leland B. Luellen. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Divi-*

sion, A.I.M.E., v. 29, 1946, p. 84-85; discussion, p. 86-87.
Techniques at Inland Steel. James Smith of Republic Steel describes use of Zimmerman vacuum unit.

16-69. Results Obtained by Improved Furnace Design. Edward E. Callinan. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.*, v. 29, 1946, p. 295-297; discussion, p. 297-298.
Several design changes made in a stationary 65-ton acid-openhearth fuel-oil-fired furnace. The new design permitted the burning of fuel at a higher rate, thus allowing a decrease in melting time; and also resulted in decreased wear of refractories, hence longer furnace life, and in reduced maintenance and rebuilding costs.

16-70. Superheated Air Vs. Superheated Steam for "Atomization" of Fuel Oil. A. R. Altman. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.*, v. 29, 1946, p. 313-315; discussion, p. 315-316.
Comparative data for steel-melting experience at the Heppenstall Co., Pittsburgh. Inconclusive evidence favors superheated air.

16-71. Combustion Systems and Burners. Part II. Henry Schramm. *Steel Processing,* v. 33, May 1947, p. 304-307.
Design details of low-pressure systems and Premix burners used in the gas firing of industrial furnaces.

16-72. Crucible Melting Furnaces. *Light Metals,* v. 10, May 1947, p. 229-232.
Melting and holding furnaces installed in a British aluminum foundry for the production of gravity die-cast window frames.

16-73. Gas Heating Speeds Seamless Tube Production. E. S. Kopecki. *Iron Age*, v. 159, June 5, 1947, p. 64-68.
Installation at Babcock & Wilcox Tube Co., Beaver Falls, Pa., for which reduced operating costs, increased output, improved quality, and other advantages are claimed.

16-74. Foundry Coke and Its Relation to Cupola Melting. G. C. Creusere. *Canadian Metals & Metallurgical Industries*, v 10. May 1947, p. 23-25, 41-42.
Problem of varying amounts of metal and scrap and its effect on coke efficiency. Production of coke and various qualities. Tests for coke and its thermal properties.

16-75. Furnaceless Heating and Small Gas Furnaces. J. F. Waight and J. Palser. *Gas Journal*, v. 250, May 14, 1947, p 344-346; May 21, 1947, p. 405, 407, 409.
Use of concentrated-combustion burner systems for a variety of metallurgical processes. In many cases, use of these burners will permit elimination of furnaces. The construction and principles of these burners. (Paper presented to Sheffield Section of the Institution of Production Engineers, Feb. 19, 1947.)

16-76. The Application of Industrial Heating in the Fabrication of Aluminum Alloys at Reynolds Metals Plants. Part I. Furnaces for Processing Molten Metal. O. L. Mitchell. *Industrial Heating,* v. 14, May 1947, p. 726-728, 730, 732, 734, 736, 738, 740.
Illustrated and descriptive. (To be cont.)

16-77. The Calculation of Nickel-Chromium Resistors in Heat Treating Furnaces. Part II. Victor Paschkis. *Industrial Heating,* v. 14, May 1947, p. 756, 758, 760, 768.
A discussion of the mathematics concerned.

16-78. Symposium on Soaking-Pit Operation. Part II. *Industrial Heating,* v. 14, May 1947, p. 770, 772, 774, 776.
Summarizes a recent meeting of the Steel Works Section of the Engineers' Society of Western Pennsylvania, Pittsburgh.

16-79. Drying Ovens With Low Temperature Radiant Panels. Robert B. Grossman. *Industrial Heating,* v. 14, May 1947, p. 805-806, 808, 810, 812-814.
A successful application of radiant-panel drying.

16-80. Ferrous and Nonferrous Metals Treated in Commercial Steel Treating Co. Plant. Part II. *Industrial Heating,* v. 14, May 1947, p. 836, 838, 840, 842.
Heat treating facilities of the Commercial Steel Treating Co., Cleveland.

16-81. Heat Treatment Furnaces. *Metallurgia,* v. 36, May 1947, p. 31-38.
Some recent installations.

16-82. Gas Turbine Applications in Iron and Steel Works. *Journal of the Iron and Steel Institute,* v. 156, May 1947, p. 98-103
A symposium consisting of the following sections: Power applications, by A. T. Bowden. Blast-furnace blowing applications — Section I, The axial blower, by W. H. Gibson; Section II, The bled-axial gas-turbine blower, by J. W. Railly; and Section III, Operation and control of the bled-axial gas-turbine blower, by R. G. Voysey.

16-83. Openhearth Furnaces. D. Kilby. *Iron and Steel,* v. 20, May 23, 1947, p. 209-214; discussion, p. 291-292.
Firing of openhearths with coke-oven gas. Design factors, a description of a 100-ton furnace, fuel characteristics and consumption, furnace operation, and refractory consumption. Arrangement of water-cooled jacket and design of combined pitch-creosote and gas burner, and pitch-creosote atomizer.

16-84. Openhearth Furnace Combustion. Parts I and II. *Iron and Steel,* v. 20, May 23, 1947, p. 258-266.

An experimental furnace for the investigation of thermal problems. Description of plant, by A. H. Leckie, J. R. Hall, and C. Cartlidge. The effects of gas rate, port size, air-gas ratio, furnace pressure, and gas calorific value, by A. H. Leckie, J. F. Allen, and G. Fenton.

16-85. Use of Oxygen in Combination With Openhearth Furnace Fuel. *Industrial Heating,* v. 14, June 1947, p. 962, 964.

A discussion.

16-86. A New Principle in Induction Heating. Thomas E. Lloyd. *Iron Age,* v 159, June 12, 1947, p. 46-48.

New type of induction-heating apparatus known as the "Gordon Trigaton". Among the features claimed for it are: constant work-coil power output; stepless power-output control; high operating efficiency with operating frequencies in the range of 500,000 cycles that can be adjusted upward or downward; unit part construction; and a quick, inexpensive work coil construction. The instrument used in converting 60-cycle energy into radio-frequency energy is a specially designed gaseous three-element tube.

16-87. Some Technical Aspects of Oil-Firing Industrial Furnaces. G. Reginald Bashforth. *Metallurgia,* v. 36, June 1947, p 57-62.

The characteristics and properties of fuel oil, its advantages and disadvantages, storage and supply lines, atomization, burner and burner design, and control instruments. Brief reference is also made to the use of tar and tar oils.

16-88. Development of an Oil-Fired Pile-Heating Furnace for the Wrought Iron Industry. L. G. A. Leonard. *Metallurgia,* v 36, June 1947, p. 95-96.

Furnace was specially designed for pile heating and is fired by oil. It has a thermal efficiency about three times that of the coal-fired furnace it replaced.

16-89. Reverberatory Furnace. *Metal Industry,* v. 70, June 13, 1947, p. 440.

British ½-ton oil-fired furnace for melting of aluminum alloys.

16-90. Controlling an Indirect-Arc Rocking Electric Furnace. *Electrical Manufacturing,* v. 40, July 1947, p. 108-109, 198.

Automatic rocking through variable angles up to 180° is accomplished with limit switches and relays, while automatic feed of the arc carbons is performed hydraulically under electric control.

16-91. Large Electrically Heated Oven Age Hardens Aluminum at Boeing Aircraft Plant. Fred M. Perkins. *Industrial Heating,* v. 14, July 1947, p. 1153-1154, 1156, 1158-1159.

The oven and its controls.

16-92. New Continuous Pouring Induction Melting Furnace. *Iron Age,* v. 160, July 24, 1947, p. 55.

In Lindberg-Fisher induction melting furnace for aluminum, brass, and zinc, the two chambers, one of which is for charging and the other for pouring, are connected by a series of straight line melting channels. It is claimed that the metal in the pouring chamber is always at pouring temperature, and that adding cold metal to the charging chamber does not affect temperature in the pouring chamber, within reasonable limits.

16-93. Oil Condensate Trap Designed for Smoke Exhausters. *Iron Age,* v. 160, July 24, 1947, p. 64.

Home-made trap designed to eliminate the adverse effects of oil condensation where smoke exhausters are used with heat treating furnaces.

16-94. Electric Apparatus for Three-Phase Arc Furnaces. N. R. Stansel and and A. R. Oltrogge. *The Electrochemical Society Preprint 91-25,* 1947, 11 p.

16-95. Centralization of High-Frequency Current Supply for Induction Heat Treatment Furnaces. G. V. Kliushin. *Industrial Power (U.S.S.R.),* v. 4, no. 2, 1947, p. 4-6. (In Russian.)

A new circuit for a series of heat treatment furnaces with an automatic central control. This circuit has been used in a Russian plant where it resulted in considerable saving in manpower and electric current.

16-96. Planning a Toolroom Heat Treating Department. Part I. R. C. Onan. *Iron Age,* v. 160, July 31, 1947, p. 40-44.

Various types and sizes of heat treating and brazing furnaces and their relative capacities and applications. (To be continued.)

16-97. New Plant and Tools. *Automobile Engineer,* v. 37, July 1947, p. 261-264.

Recent developments in British production equipment include: a heat treating furnace; adjustable honing mandrels; automatic work table; Speetol-Gordon magnascope; and a steam generator.

16-98. Role of Convection in Medium Temperature Processing With Special Reference to Its Influence on the Design of "Infrared" Ovens. Part I. J. B. Carne. *Industrial Gas,* v. 26, July 1947, p. 7-9, 30, 32.

Heat transfer rates in various ovens for different materials and conditions are shown graphically. 16 ref. (To be continued.)

16-99. A Model Tin-Stack Firing System. E. J. Funk, Jr. *Industrial Gas,* v. 26, July 1947, p. 12.
System used by Tennessee Coal and Iron in their tinplate division.

16-100. New Developments in Heat Processing Equipment. F. G. Daveler. *Industrial Gas,* v. 26, July 1947, p. 13-15, 25-27.
Controlled atmospheres; accelerated drying ovens; high-speed aluminum annealing; glass dropping kilns.

16-101. Tunnel Kilns for the Firing of Enameled Sheets. E. L. Berman. *Glass and Ceramic Industry (U.S.S.R.),* no. 2, 1947, p. 19-23. (In Russian.)
Details of the design and performance of 5 different kilns.

16-102. Dimensions et Formes Des Tuyeres de Cubilots. (Dimensions and Shapes of Tuyeres in Cupola Furnaces.) Gabriel Joly. *Fonderie,* May 1947, p. 651-654.
The application of several new principles permits logical division of the vents inside the cupola furnace, assuring even melts, and a minimum of wear of the refractory lining, and avoids oxidation of the metal.

16-103. Automatic Operation of the Electric Arc Furnace. H. G. Frostick. *Steel,* v. 121, Aug. 4, 1947, p. 104, 107, 124, 126.
How equipment for controlling the position of furnace electrodes reduces power costs, heating time and maintenance.

16-104. Silicon Carbide Radiant Tubes for Annealing Furnaces. M. H. Luttropp. *Iron Age,* v. 160, Aug. 14, 1947, p. 58-61.
Recent installation of a high temperature annealing furnace with silicon carbide radiant tubes and conveyer rolls. Various construction features of this continuous, controlled atmosphere, tube-annealing unit. A technique for predetermining furnace speed.

16-105. Production of Electric Furnace Electrodes. Lyman C. Judson. *Iron Age,* v. 160, Aug. 14, 1947, p. 62-64.
The manufacturing processes by which carbon and graphite electrodes are made by National Carbon Co.

16-106. Furnace With Mesh Belt Conveyer for Continuous Heat Treatment. *Machinery (London),* v. 71, July 17, 1947, p. 72.
A Gibbons-Wild-Barfield furnace equipped with a mesh-belt conveyer for the continuous heat treatment of bolts and similar small parts.

16-107. The Use of Producer Gas in the Production of Steel Castings. B. Evans. *Machinery Lloyd (Overseas Edition),* v. 19, July 19, 1947, p. 99-101.
Development of use of producer gas in production of steel castings at P. R. Jackson's in England.

16-108. Ignitron Converters for Induction Heating. R. J. Ballard and J. L. Boyer. *Proceedings of the National Electronics Conference,* v. 2, 1946, p. 455-469.
A new type of ignitron frequency converter for melting furnace and forging heater application. Emphasis is on circuits.

16-109. Heat Losses in Furnace Linings. Part II. J. D. McCullough. *American Gas Journal* v. 167, Aug. 1947, p. 36-38.
Data for making heat loss calculations for industrial gas-fired furnaces and ovens of three types: continuously fired, intermittently operated, and those shut down weekly.

16-110. Dielectric Loss at High Frequency. J. B. Whitehead. *Electrical Engineering,* v. 66, Sept. 1947, p. 907-910.
In application of dielectric heating to various industrial processes, alternating frequencies between 1 and 30 mc., and rates of temperature rise of 50° F. and upward, are common. The measurement of dielectric properties of a material under such varying conditions by a calorimetric substitution method.

16-111. Universal Control of Induction Heater. Austin B. Shields. *Machine Design,* v. 19, Sept. 1947, p. 147-148.
Progressive heating fixture which automatically cycles and controls induction heating operations.

16-112. Characteristics of Basic Gas Combustion Equipment. D. A. Campbell. *Steel,* v. 121, Sept. 22, 1947, p. 78-79, 103-104, 106, 108.
Compares techniques, defines terms, and presents formulas for design and use of various kinds of mixers and burners for industrial installations.

16-113. Induction Heating Steps-Up Desoldering Operations. *Steel,* v. 121, Sept. 22, 1947, p. 96.
East Ohio Gas Co., Cleveland, uses an induction heating unit to remove solder from gas meters during maintenance work. Technique results in large savings of time.

16-114. "Infrared" Heating by Gas—Its Development and Practice Today. J. B. Carne. *Metallurgia,* v. 36, Aug. 1947, p. 193-196.
Applications; development; gas units; fundamental principles; subsidiary advantages; the heat-transfer problem. (To be continued.)

16-115. Electric Resistance Type Appliances. Victor Paschkis. *Industrial Heating,* v. 14, Sept. 1947, p. 1432-1434, 1436, 1438, 1440, 1442, 1444, 1448.
Direct and indirect types of electrically heated furnaces. (Part of a series.)

16-116. Electronic Frequency Converters for Induction Melting Furnaces. S. R.

Durand. *Iron Age,* v. 160, Sept. 25, 1947, p. 64-67, 134.

Several furnace installations employing this type of power conversion for melting both alloy steels and nonferrous alloys. An installation for holding molten steel at constant temperature for continuous casting. Some notes on the installation of lining for high-frequency melting furnaces with mercury arc power converters.

16-117. Adaptation du Principe du Chargement Automatique des Cubilots a une Installation Existante. (Adaptation to an Existing Installation of the Automatic Charging Principle for Cupola Furnaces.) Roger Lesage. *Fonderie,* June 18, 1947, p. 694-696.

Apparatus for automatic charging of two cupola furnaces.

16-118. Radio Frequency Heating—What It Is and How It Works. B. E. Rector *Better Enameling,* v. 18, Sept. 1947, p. 15-18.

Various applications.

16-119. Consolidated Vultee Reconversion Features Gas Fuel. Gerald Eldridge Stedman. *Industrial Gas,* v. 26, Sept. 1947, p. 7-9.

Use of gas-fired ovens for baking of finishes on various products which have replaced the airplanes produced during the war.

16-120. Role of Convection in Medium Temperature Processing; With Special Reference to Its Influence on the Design of "Infra-Red" Ovens. Part III. (Concluded.) J. B. Carne. *Industrial Gas,* v. 26, Sept. 1947, p. 15-17, 26-29.

New determinations of the coefficients of natural convection of spheres and vertical plates and influence of convective loss on the design and operation of infrared equipment. 16 ref.

16-121. Some Features of Openhearth Furnace Design. Part I. G. Reginald Bashforth. *British Steelmaker,* v. 13, Sept. 1947, p. 446-454.

An extensive discussion and review of recently published information. 10 ref. (To be continued.)

16-122. The Use of Anthracite as Cupola Fuel. C. C. Wright. *Transactions of the Fifth Annual Anthracite Conference of Lehigh University,* 1947, p. 123-154.

Various factors used to evaluate fuel performance in the cupola. Results of experimental investigation. Almost 100 tests, using a 36-in. cupola with intermittent taps and heats up to 10 tons.

16-123. Electric Salt Bath Furnaces Do Complete Commercial Heat Treating Job. *Modern Machine Shop,* v. 20, Oct. 1947, p. 184, 186, 188, 190, 192.

Furnaces are capable of doing any type of heat treating job, on any shape, with cleanliness and accuracy.

16-124. Investigation of the Collection of Liquid Slag in an Experimental Furnace. U. L. Marshak. *Engineers' Digest (American Edition),* v. 4, Sept. 1947, p. 420-422.

Experimental equipment for slag collecting. Efficiency is charted versus velocity of flame impingement upon the slag bottom, Froude number, and initial ash concentration of the gases. Certain principles for application to the design of full-size furnaces are deduced, and applied to the construction of these furnaces. (Translated and condensed from *Izvestya Vsesoyuznoga Teplotechnicheskogo Instituta,* v. 16, no. 3, 1947, p. 18-26.)

16-125. A Lead Melting Furnace. *Engineer,* v. 184, Sept. 12, 1947, p. 255.

Furnace built by British firm has a capacity of 7000 lbs. per hr., when loaded in batches of 1800 lb. each.

16-126. Dielectric Heating. B. E. Rector. *Product Engineering,* v. 18, Oct. 1947, p. 158-162.

Six factors which should be considered in determining whether or not use of dielectric heating will be profitable and desirable for a given application. Characteristics of dielectric materials.

16-127. 30 Years' Advance in the Basic Openhearth. J. J. Golden and M. F. Yarotsky. *Metal Progress,* v. 52, Oct. 1947, p. 572-577.

Improvements in refractories, instrumentation, metallurgical control, use of oxygen, pit and mill practice.

16-128. Development of Furnaces With Recirculating Atmospheres. John Ade. *Metal Progress,* v. 52, Oct. 1947, p. 594-598.

The development of various types of furnaces in which the hot atmosphere is circulated at speeds on the order of 100 miles per hour, and the most recent improvement by which this circulation is reversed in direction at fairly frequent intervals.

16-129. New Developments in Industrial Furnaces and Ovens. *American Gas Association Proceedings,* 1946, p. 253-268

A panel discussion presented by representatives of five manufacturers of industrial furnaces and ovens. Oven vs. furnace construction for temperatures up to 1200° F., by Herman Gehnrich. Recirculation as applied to heating and cooling of industrial ovens, by Richard J. Ruff. Prepared furnace atmospheres, by Charles E. Thomas. Continuous heating and heat treatment of bar stock and tubing, by Frederic O. Hess. Radiant tubes, by W. M. Hepburn.

16-130. "Infrared" Heating by Gas—Its Development and Practice Today. J. B. Carne. *Metallurgia,* v. 36, Sept. 1947, p. 245-249.

Concluded.

16-131. The Role of Convection in Medium Temperature Processing With Special Reference to Its Influence on the Design of "Infrared" Ovens. J. B. Carne. *Fuel in Science and Practice,* v. 26, July-Aug. 1947, p. 90-101.

16 references. (Presented at Annual Meeting of A.S.M.E., New York, Dec. 2 to 6, 1946.)

16-132. Selector Chart for Induction Heating and Melting Equipment. *Iron Age,* v. 160, Oct. 16, 1947, p. 139.

Chart was prepared by Ajax Electrothermic Corp., Trenton, N. J., and is based on engineering data collected since the first applications of high frequency heating and melting in 1916.

16-133. Blast Furnacemen Stress Importance of Sound Hearth Construction. John D. Knox. *Steel,* v. 121, Oct. 20. 1947, p. 102, 105.

Proceedings of joint meeting of the Blast Furnace & Coke Association of the Chicago District and the Eastern States Blast Furnace & Coke Oven Assoc., Cleveland, Oct. 10.

16-134. Blast Furnace Relined and in Service in 44 Days. *Blast Furnace and Steel Plant,* v. 35, Oct. 1947, p. 1227-1229.

General information and data relative to this accomplishment.

16-135. Metal Recuperators. H. Escher. *Iron and Steel,* v. 20, Oct. 1947, p. 501-504.

Details of a new design for high-temperature furnaces. The recuperative, continuous-firing method is used with either pulverized coal or gas or mixtures as fuel. About 60 large units have been erected or are under construction and are used for preheating air and various fuel gases. They have been applied to billet heating, forge furnaces, soaking pits, and glass-melting furnaces. Proposed design and calculations for 125-ton steel melting furnace. (Condensed from paper presented at World Power Conference, The Hague, Netherlands, Sept. 3, 1947.)

16-136. Induction Melting of High-Alloy Steels. *Industrial Heating,* v. 14, Oct. 1947, p. 1644, 1646.

Summary of paper by R. J. Wilcox of Michigan Steel Castings Co., at recent Electric Furnace Steel Conference, Pittsburgh, Pa.

16-137. The Design of Industrial Ovens With Special Reference to Safety. C. A. Litzler. *Industrial Heating,* v. 14, Oct. 1947, p. 1710-1712, 1714-1715.

Condensed from paper presented at recent conference of the Industrial and Commercial Gas Section of the American Gas Assoc., Boston, Mass. (To be continued.)

16-138. Controlled Furnace Atmospheres. *Aircraft Production,* v. 9, Oct. 1947, p. 380-381.

Use of paraffin burners in new British equipment.

16-139. Some Features of Openhearth Furnace Design—II. G. Reginald Bashforth. *British Steelmaker,* v. 13, Oct. 1947, p. 502-511.

Furnace roofs; ports; regenerators. 16 ref.

16-140. Infrared Drying. L. Sanderson. *Machinery Lloyd (Overseas Edition),* v. 19, Oct. 11, 1947, p. 75-77.

Method applications, equipment, advantages.

16-141. Multiple-Position Coils Speed Induction Heating. Frank W. Curtis. *American Machinist,* v. 91, Oct. 23, 1947, p. 90-93.

Some typical coil arrangements.

16-142. How a Steel Mill Prepares Blast Furnace Gas for Fuel—I. W. M. Cline, Jr. *Power,* v. 91, Nov. 1947, p. 72-73.

Blast furnace operating principles; control of gas output; amounts of gas involved; gas storage; gas distribution. (To be continued.)

16-143. Furnace With Tungsten Heating Elements. O. P. Mchedlov-Petrosian. *Factory Laboratory (U.S.S.R.),* v. 13, April 1947, p. 494-495. (In Russian.)

A laboratory tube furnace for temperatures of 1500° C. inside the tube.

16-144. Advantages of Induction Furnaces in Line Die Casting. Herbert Chase. *Steel,* v. 121, Nov. 10, 1947, p. 108-109, 136, 138.

Iron pickup and drossing losses are reduced and variations in composition minimized. Use of "hardener" rod provides a convenient means of preparing alloy without pigging. Feeding molten alloy through heated troughs to many holding furnaces is reported to be highly successful.

16-145. Evaluation of Openhearth Checkers. Walter B. Bryant. *Iron Age,* v. 160, Nov. 13, 1947, p. 76-81.

Various arrangements and sizes of openhearth checkers, from the viewpoints of cleanliness, stability, expansion and contraction, and effectiveness. The more common arrangements, and a special-type tile. Performance data covering 11 installations.

16-146. Automatic Rapid Raising of Electrodes. S. A. Kremera and B. M. Khorkova. *Industrial Power (U.S.S.R.),* v. 4, Sept. 1947, p. 12-13. (In Russian.)

Electrical circuit for speeding up the manipulation of electrodes during the operation of electric furnaces.

16-147. Factors Affecting Heating by Induced Electric Current. Harlan A. Messner. *Production Engineering & Management,* v. 20, Nov. 1947, p. 60-63.

The phenomenon of electrically induced heat and the factors affecting its use as a production-line tool.

16-148. Karburierung und Beheizung von Siemens-Martin-Ofen mit Steinkohlenstaub. (Carburizing and Heating With Pulverized Coal in Siemens-Martin Furnaces.) Kurt Guthmann. *Stahl und Eisen,* v. 66-67, March 27, 1947, p. 116-122.

Application of pulverized coal for carburizing and heating in a Siemens-Martin furnace. American experience with this type of fuel.

16-149. The All-Basic Openhearth Furnace; Proposed System of Construction. J. E. Pluck. *Engineers' Digest (American Edition),* v. 4, Oct. 1947, p. 456-460.

Advantages and disadvantages of the all-basic furnace; use of basic uptakes in Britain; expansion properties of refractories; continental roof construction; the original weight-balanced roof; proposed roof construction for fixed and tilting furnaces and their load and force diagrams; furnace insulation. Proposed construction will allow more even distribution of loads. (Condensed from *Iron and Coal Trades Review,* v. 155, Aug. 8, 1947, p. 257-265.)

16-150. Radio-Frequency Heating—What It Is and How It Works. B. E. Rector. *Machinery Lloyd (Overseas Edition),* v. 19, Oct. 25, 1947, p. 100-103.

A nontechnical explanation of the basic principles of induction and dielectric heating.

16-151. The Physics of Industrial Diathermy—Part 3. A. W. Lay. *Electronic Engineering,* v. 19, Nov. 1947, p. 361-362, 364.

Analysis of application of high-frequency heating to industrial processes, including casehardening and tinning of steel plates.

16-152. Study of Blast Furnace Downcomer Failures. Charles M. Squarcy. *Blast Furnace and Steel Plant,* v. 35, Nov. 1947, p. 1353-1356, 1377.

Abstract from similar article in *Steel.* (See item 16-155.)

16-153. Immersion Heating: Part I. Maurice J. Dewey. *Industrial Heating,* v. 14, Nov. 1947, p. 1822, 1824, 1826, 1828, 1830, 1932.

History of the development of immersion gas heating; several new practical applications of process. (Presented at Industrial Gas School, Columbus, Ohio, sponsored by American Gas Assoc.)

16-154. Induction Heating Desolders Gas Meters. *Industrial Heating,* v. 14, Nov. 1947, p. 1854, 1856.

Use of induction heating in maintenance or servicing of gas meters.

16-155. Investigation of Blast Furnace Downcomer Failures. Charles M. Squarcy. *Steel,* v. 121, Nov. 24, 1947, p. 110, 112, 115, 116.

Study of dirty gas main conditions shows that mains which are too small permit erosion; those too large allow buildup which causes obstructions. Results of survey of conditions at various plants in Chicago area. (From paper presented at joint meeting of Blast Furnace and Coke Assoc. of Chicago and Eastern States Blast Furnace and Coke Oven Assoc., Cleveland, Oct. 10, 1947.)

16-156. Steel Processing Furnaces. Edmund B. Neil. *Steel Processing,* v. 33, Nov. 1947, p. 696-702c.

The contruction, operation, and applications of various types of controlled-atmosphere furnaces.

16-157. Some Features of Openhearth Furnace Design. Part III. G. Reginald Bashforth. *British Steelmaker,* v. 13, Nov. 1947, p. 554-563.

Design of slag pockets; furnace flues; reversing valves; furnace chimney and chimney flues; waste-heat boilers; and insulation. (To be continued.)

16-158. Fundamentals of Openhearth Checkerwork Design. Horace W. Potter. *Steel,* v. 121, Dec. 8, 1947, p. 112, 114, 116, 118, 120.

Presented at Eastern Section Meeting, National Open Hearth Committee, A.I.M.E., Philadelphia, Oct. 17, 1947.

16-159. Anthracite as Cupola Fuel. C. C. Wright. *American Foundryman,* v. 12, Nov. 1947, p. 40-47.

Paper presented before Fifth Annual Anthracite Conference, Bethlehem, Pa., May 8, 1947. (To be continued.)

16-160. Carnegie-Illinois Builds Two New 1500-Ton Blast Furnaces. *Iron and Steel Engineer,* v. 24, Dec. 1947, p. 100-105.

Recent figures on above furnaces; detail drawings.

16-161. The Redesign of a Direct-Fired Air Heater. R. M. Rush, H. A. Pietsch, and D. H. Marlin. *Iron and Steel Engineer,* v. 24, Dec. 1947, p. 105-108.

Possible uses for welded stainless steel assemblies in furnace design.

16-162. A New Batch-Type Gas Cyaniding Furnace. J. A. Dow. *Metal Progress,* v. 52, Dec. 1947, p. 984-987.

Advantages of the continuous gas-cyaniding furnace, at lower equipment cost, are secured in a batch-type furnace with work contained in shallow

boxes charged and discharged through a vestibule at one end. The cold charge is heated by an interchange of heat with an "accumulator" built into the furnace walls. The gas atmosphere is continuously adjusted to the work temperature by an arrangement of catalyst tubes, and there is a special oil-quenching setup.

16-163. Direct Heat Resistance Electric Furnaces. Victor Paschkis. *Industrial Heating,* v. 14, Dec. 1947, p. 2002, 2004, 2006.

16-164. Steel Laminations Annealed in Electrically Heated Elevator Furnace. *Industrial Heating,* v. 14, Dec. 1947, p. 2008, 2010.

Electrically-heated, 180-kw., 208-volt, 3-phase, high-temperature, elevator furnace for annealing punchings of magnetic material in a hydrogen or nitrogen atmosphere up to a maximum temperature of 2150° F.

16-165. The Design of Industrial Ovens With Special Reference to Safety. Part II. C. A. Litzler. *Industrial Heating,* v. 14, Dec. 1947, p. 2043, 2046, 2048, 2050, 2052.

Points of incipient danger in any oven installation and precautions to be taken for the prevention of accidents. (To be continued.)

16-166. Electric Furnace Brazing for Mass Production. Henry Eickelberg. *Iron Age,* v. 160, Dec. 18, 1947, p. 56-59.

Utilization of a continuous, controlled-atmosphere, electric furnace for copper brazing, silver soldering, and bright annealing of a variety of products. Flexibility of the furnace is indicated by illustrations of a variety of sizes and shapes of parts produced, varying from a fraction of an ounce to several pounds in weight.

16-167. Electrische Ovens Voor Een Eenvoudige Fabrieks-Harderij. (Electric Furnaces for a Small Industrial Heat Treating Plant.) *Smit Mededelingen,* v. 2, Jan-March 1947, p. 3-8.

16-168. Centraliserad Gasgenerering; Nagra Erfarenheter vid Degerfors Jarnverk. (Centralized Gas Production; Some Experiences in the Degerfors Iron Works.) Erik Hermanson. *Jernkontorets Annaler,* v. 131, no. 10, 1947, p. 425-463; discussion, p. 463-486.

The mechanical gas producers consist of two sections, the coal being carbonized at low temperature in the upper section by some of the producer gas made from the coke in the lower water-jacketed section. There is a gas offtake in each section. Low-quality coal (40 to 85% C) plus a mixture of wood chips, peat, and coke breeze is used as fuel. 11 ref.

16-169. George D. Roper Corp. Installs Kathabar to Condition Furnace Atmosphere. *Enamelist,* v. 24, Dec. 1947, p. 5-7, 47.

Unique installation for control of the moisture content of a porcelain enameling furnace. (To be continued.)

16-170. Experiences With Balanced Air Feed in the Cupola. T. H. Taft and H. A. Hallett. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. A165-A175; discussion, p. A176-A184.

Previously annotated in R.M.L., v. 3, 1946.

16-171. Hot-Blast Cupola Design. E. Longden. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. A148-A164; discussion, p. A176-A184.

Previously annotated in R.M.L., v. 3, 1946.

16-172. A High-Temperature Electric Tube Furnace. J. W. Gartland. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 121-132; discussion, p. 132-133.

Previously annotated in R.M.L., v. 2, 1945.

16-173. A Thermal Engineer's View of an Arc Furnace; Survey of Some Heat Problems in Arc Furnaces. Victor Paschkis. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 151-158; discussion, p. 159-162.

Previously annotated in R.M.L., v. 2, 1945.

16-174. Some Thoughts on Experimental Electric Arc Furnace Smelting. H. S. Newhall. *Transactions of the Electrochemical Society,* v. 88, 1945, p. 163-182; discussion, p. 182-183.

Previously annotated in R.M.L., v. 3, 1946.

SECTION XVII

REFRACTORIES AND FURNACE MATERIALS

17-1. Plastic-Lined Furnace Doors. J. N. Hornak. *Industrial Heating,* v. 13, Dec. 1946, p. 2036, 2038.

Design and construction of plastic-refractory lined furnace doors. Service lives of different designs under operating conditions. (Paper presented at the recent National Open-hearth Conference sponsored by the Iron & Steel Div. of the American Institute of Mining and Metallurgical Engineers.)

17-2. Recent Progress in Basic Open-hearth Furnace Refractories and Masonry. Part II. *Industrial Heating,* v. 13, Dec. 1946, p. 2040, 2042, 2044, 2055-2056.

Progress in silica refractories; mixer linings; relation of insulation to operating economy; results obtained from the use of carburized, tarred and special nozzles for ladles.

17-3. Notes on Reaction Between MgO and Various Types of Refractories. C. L. Norton, Jr., and Bradford Hooper. *Journal of the American Ceramic Society,* v. 29, Dec. 1, 1946, p. 364-367.

Samples of various types were tested for reaction with magnesium oxide at various temperatures, to determine the proper refractory for use in a furnace where brickwork is exposed to magnesia dust. Photographs of the samples after exposure.

17-4. The Behavior of Quartz in Fire-clay Refractories. J. Sharp Smith and Peter F. F. Clephane. *Gas Times,* v. 49, Dec. 7, 1946, p. 265-266.

Summary and discussion of paper presented at Autumn Research Meeting of the Institution of Gas Engineers, Nov. 1946.

17-5. New Method for Building Open-hearth Flues. *Steel,* v. 120, Jan. 20, 1947, p 94, 97.

Application of refractory concrete saves time in laying up flues from checkers to stack and facilitates building streamlined flues with continuously changing sections. Material costs reduced through use of salvaged materials. Rebuilding job at shop in Pittsburgh district.

17-6. On the Crystalline Structure of SiC and on the Geometrical Theory of Silicon Carbide Structures. G. Zhdanov and Z. Minervina. *Journal of Physics (U.S.S.R.),* v. 10, no. 5, 1946, p. 422-424. (In English.)

A series of X-ray investigations concerning the structure of SiC and the phase composition of several commercial specimens. Results substantiated the structural theory previously proposed by the authors.

17-7. Foundry Refractories—Their Properties and Application. C. A. Brahares. *American Foundryman,* v. 11, Jan. 1947, p. 41-45; discussion, p. 45.

Important properties of the various refractories used in the foundry—their practical meaning to the foundry operator and particular applications.

17-8. Structural Design of Refractory and Heat Resistant Concrete. Part I. Elements of Design. *Industrial Heating,* v. 14, Jan. 1947, p. 116, 118, 120, 122, 124, 126.

Design factors are unit strengths, volume changes and methods of reinforcing. Use of the material in ducts, flues, stacks; combustion chambers; coke oven batteries; heat treating and annealing furnaces; as a structural and a lining material.

17-9. Refractories in Germany. *Refractories Journal,* v. 22, Dec. 1946, p. 400-404.

Basic refractories from serpentine; silica brick; synthetic sillimanite refractories; kyanite-method of production and properties. Information was obtained by means of interviews with German scientists and engineers, and from documents. (Reprinted from British Intelligence Objectives Sub-Committee Report No. 458.)

17-10. Refractory Developments Keep Pace With Industrial Progress. *Brick & Clay Record,* v. 110, Jan. 1947, p. 56, 58, 60, 62.

1946 developments in refractories and their manufacture.

17-11. Comments on the German Refractories Industry as Investigated in 1945. Stuart M. Phelps. *Brick & Clay Record*, v. 110, Jan. 1947, p. 66-68, 70.

Silica refractories were made much like those in this country; basic refractories were no better than ours and some were very inferior. Carbon refractories used almost universally in lower portion of blast furnaces.

17-12. Quartz in Fireclay Refractories. J Sharp Smith and Peter F. F. Clephane. *Gas Journal*, v. 249, Jan. 8, 1947, p 91-94.

Test pieces were subjected to heat treatment at various temperatures and for various times up to 28 days. Changes in structure were determined by microscopic examination. Photographs and micrographs. (To be continued.)

17-13. Quartz in Fireclay Refractories. (Continued.) J. Sharp Smith and Peter F. F. Clephane. *Gas Journal*, v. 249, Jan. 15, 1947, p. 156, 159-160, 165, 169.

Study of the behavior of quartz as a major constituent of fireclay brick. Reaction between quartz and clay was found to result in production of glass of low refractory properties. Quartz also reduced thermal shock resistance of the product.

17-14. Annual Report of American Refractories Institute Fellowship at Mellon Institute. Stuart M. Phelps. *American Refractories Institute Technical Bulletin No. 82*, July 1946, 8 p.

Improved test methods and preparation and revision of specifications.

17-15. Tensile Properties of a Sillimanite Refractory at Elevated Temperatures. Alfred E. Kunen, Frederick J. Hartwig and Joseph R. Bressman. *National Advisory Committee for Aeronautics Technical Note No. 1165*, Nov, 1946, 14 p.

Tensile strength, stress-to-rupture characteristics and modulus of elasticity of a sillimanite refractory were investigated at various temperatures from 80 to 1950° F.

17-16. Measuring Stick for the Life of a Blast Furnace Lining. F. E. Kling. *Blast Furnace and Steel Plant*, v. 35, Feb. 1947, p. 215-216.

Method of calculation based on number of days of operation.

17-17. Refractory Applications for Acid Openhearth Furnaces. R. Russell Fayles. *Blast Furnace and Steel Plant*, v. 35, Feb. 1947, p. 217-219.

Refractory experimentation on an acid furnace which has improved both furnace operation and refractory performance. Furnace under discussion is an oil-fired unit tapping about 60 net tons of ingots, All heats are low-carbon rimmed steel, bottom-poured, for direct rolling into plates. The charge is normally composed of 20% cast iron and molds, with the remaining 80% of low-carbon home plate scrap. Heats normally will show about 0.30% carbon on the first test and will be at around 0.10% carbon when tapped, having had about 500 lb. of ore worked through the heats during the refining period.

17-18. Acid Heat Resistant Solution for the Quartzite Masonry of Refractory Furnaces. S. S. Bermant. *Reports of the Academy of Sciences of U.S.S.R.*, v. 54, Dec. 21, 1946, p. 811-812. (In Russian.)

Proposes the use of marchalite (84.62% SiO_2; 0.73% Fe_2O_3; 9.56% Al_2O_3; 1.24% CaO; and 0.23% MgO) in combination with a sulphite-cellulose extract as mortar for joining high-temperature refractories.

17-19. Vermiculite Insulating Brick. Robert F. Rea. *American Ceramic Society Bulletin*, v. 26, Feb. 15, 1947, p. 36-38.

The development of vermiculite insulating brick The product containing 25% colloidal magnesium silicate, Eyrite, will pass the A.S.T.M. reheat specifications for a 2000° F. class brick. The initial firing shrinkage is approximately 2%.

17-20. A New Highly Refractory Material "Thermitomullite". R. L. Pevzner. *Bulletin of the Academy of Sciences of U.S.S.R.*, Section of Technical Sciences, no. 10, 1946, p. 1431-1437. (In Russian.)

A new highly heat resistant refractory material produced from mullite, using the new improved thermit method of Goldschmidt. This material contains 22.18% SiO_2, 74.86% Al_2O_3, 1.45% MnO, 0.32% MgO, 0.52% CaO, and 0.60% K_2O; is gray in color, and has a compression strength of over 2000 kg. per sq. cm. and heat resistance above 1800° C.

17-21. Rammed Refractories in Electric Furnaces. Robert H. Zoller. *Brick & Clay Record*, v. 110, March 1947, p. 72, 74, 76.

Selecting a refractory for the job; developing routine methods for installation; preparing the unit for service.

17-22. Plastic Lined Openhearth Doors Give Longer Life and Reduce Furnace Cooling. J. N. Hornak. *Brick & Clay Record*, v. 110, March 1947, p. 76, 78.

Experiments indicate that they require less crane time and maintenance. For economic use, they must have life ratio of 10 to 1 over brick-lined doors.

17-23. New Castable Refractory Withstands 3000° F. *Iron Age*, v. 159, March 20, 1947, p. 45.

Kaocast is said to withstand temperatures as high as 3000° F. and

shows excellent stability and resistance to spalling under repeated heating and cooling cycles. Other features of Kaocast include its very small volume change on initial firing and its lack of shrinkage or expansion under continuous use at high temperatures.

17-24. Elastic Behavior and Creep of Refractory Brick Under Tensile and Compressive Loads. Lewis E. Mong. *Journal of the American Ceramic Society*, v. 30, March 1, 1947, p. 69-78.

Specimens from nine brands of firebrick, including two high-alumina, four fireclay, two siliceous fireclay, and one silica were subjected to tensile and compressive creep tests at 11 temperatures from 25 to 950° C. inclusive, for 240 days. Creep results under compressive stress could not be correlated with results under tensile stress. Moduli of elasticity at room temperature were determined before and after the various heat treatments. 12 ref.

17-25. Structural Design of Refractory and Heat Resistant Concrete. Part II. *Industrial Heating*, v. 14, March 1947, p. 464, 466, 468, 470, 472, 511.

Basic design factors governing the use of refractory concrete made with calcium-aluminate cement, including unit strengths, volume changes, and methods of reinforcing; and the use of the material in ducts, flues, stacks, combustion-chambers, coke-oven batteries, heat treating, and annealing furnaces, as a structural and a lining material. (To be continued.)

17-26. Refractories Industry of Italy. Luigi Ponpei. *American Ceramic Society Bulletin*, v. 26, March 15, 1947, p. 88-93.

Information of a general and statistical character on available raw materials and types of refractories produced from them. Plants, control and research laboratories, and Italian technical and scientific organization. Unusually good thermal expansion and load-test equipment.

17-27. Ceramic Industry of Japan. Everett A. Thomas. *American Ceramic Society Bulletin*, v. 26, March 15, 1947, p. 94-99.

The Japanese ceramic industries are analyzed from the standpoint of production history and consumption up to 1945, inclusive. Chinaware and porcelain, porcelain enamel, structural clay products, refractories (including clay, basic, and silica), graphite crucibles, abrasive grinding wheels, and glass (including flat glass, glassware, optical glass, and fiber glass).

17-28. Cupola Refractories. Ray A. Witschey. *Foundry*, v. 75, April 1947, p. 120-123, 242, 246, 248.

Design of the refractory linings for cupolas. (Presented at Chicago Regional Foundry Conference, Nov. 21, 1946. To be concluded.)

17-29. Refratarios de Silica E Seu Emprego nos Fornos Siemens-Martin. (Silica Refractories and Their Use in Siemens-Martin Furnaces.) Felippe J. V. de A. Franceschini. *Boletim da Associacao Brasileira de Metais*, v. 3, Jan. 1947, p. 207-224; discussion, p. 224-226.

A series of high-quality refractories was investigated for classification according to their properties, namely, thickness required, durability, and joint expansion. 12 ref.

17-30. Elastic Behavior and Creep of Refractory Bricks Under Tensile and Compressive Loads. Lewis E. Mong. *Journal of Research of the National Bureau of Standards*, v. 38, Feb. 1947, p. 229-240.

Nine brands of firebrick, including two high alumina, four fireclay, two siliceous, and one silica, were subjected to creep tests, at 11 temperatures from 25 to 950° C., inclusive. Creep results with compressive stresses could not be correlated with results with tensile stresses. Moduli of elasticity at room temperature were determined before and after the various heat treatments. Changes were large for silica brick and small for fireclay brick. 13 ref.

17-31. First Report of the Converter Refractories Subcommittee. *Journal of the Iron and Steel Institute*, v. 155, Feb. 1947, p. 235-269.

Current practice regarding the internal shape of converters and the materials used for lining and patching. Properties of materials were extensively investigated in the laboratory and an effort made to correlate them with practical results. The drying and preheating of converter linings including the working temperature of the lining during these periods; subsequent blowing; results of examination of the linings before and after use.

17-32. How Germans Make High Temperature Refractories and Ceramics. *Brick & Clay Record*, v. 110, April 1947, p. 64, 66, 68.

Condensation of B.I.O.S. report outlines results of visits to 12 German plants and laboratories.

17-33. Examination of Polished Specimens of Refractories by Reflected Light. J. Raymond Hensler and Samuel Zerfoss. *Journal of the American Ceramic Society*, v. 30, April 1, 1947, p. 105-108.

The preparation of specimens and the polishing, etching, and identification of phases when the technique is applied to basic and silica refractories. Method shows the relationship of high-iron slag to tridymite and cristobalite in the silica brick and aids in

explanation of the bursting of chrome magnesite brick by iron oxide.

17-34. Shrinkage Rates in Firing Fireclay Refractories. Donald K. Stevens and Raymond E. Birch. *Journal of the American Ceramic Society,* v. 30, April 1, 1947, p. 109-113.

Direct optical measurements of length changes of five commercial fireclay refractories were made during 72-hr. firing on a uniform heating schedule of 35° F. per hr. Data obtained from room temperature to 2700° F. revealed three periods of high shrinkage rate.

17-35. Progress Report on Carbon Linings for Blast Furnaces. V. J. Nolan. *Blast Furnace and Steel Plant,* v. 35, April 1947, p. 454-460.

Thirteen American installations now in operation and twelve more in various stages of construction or planning. Conclusions reached from a study of the linings which have been installed. German use of carbon linings.

17-36. Refractories and Their Use in Steel Plants. Part II. *Industrial Heating,* v. 14, April 1947, p. 640, 642, 644.

Abuses to which refractories may be subjected, and refractory materials other than brick.

17-37. Heat Treatment of Refractory Materials. *Refractories Journal,* v. 23, March 1947, p. 99-105.

Investigation of several German plants for manufacture of basic bricks with particular reference to the design and operation of high-temperature kilns. (Reprinted from B.I.O.S. Final Report No. 831, Item No. 21 and 22.)

17-38. Cupola Refractories. Part II. Ray A. Witschey. *Foundry,* v. 75, May 1947, p. 94-95, 232, 234, 236, 238, 240.

Recommendations for maintenance of various sections of the cupola, mainly with design and replacement techniques.

17-39. New Refractory Gun Speeds Furnace Repairs. *Iron Age,* v. 159, May 8, 1947, p. 79.

Unit is equipped with a pressure hopper designed to hold 500 lb. of refractory weighing 140 lb. per cu. ft., has a discharge capacity of more than 100 lb. per min., and automatically wets the refractory shortly before the point of discharge.

17-40. Plastic Refractories. J. C. Hayman. *Iron and Steel,* v. 20, April 1947, p. 137-138.

Plastic refractories suffer from certain serious limitations, in particular the shrinkage tendency on drying and firing, and the lack of a substantial sinter as formed in situ.

17-41. Refractories From Ohio Dolomite. Harley C. Lee. *Ohio State University Engineering Experiment Station News,* v. 19, April 1947, p. 38-45.

Processing techniques used.

17-42. Behavior of Various Types of Openhearth Bottoms in Service. R. B. Snow. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 87-92.

Observation and core drillings of a number of furnace bottoms. The density obtainable with the sintered-in type.

17-43. Comparison of Fully Rammed Bottoms, Partly Rammed Bottoms With Burned-In Top Surface, and Fully Burned-In Bottoms. B. D. McCarthy. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 93-95; discussion, p. 95-98.

Operating experience.

17-44. Experience With Sintered and Rammed Bottoms at Wisconsin Steel Works. E. H. Schwartz. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 98-102; discussion, p. 102-103.

Use of rammed hearths in basic openhearth furnaces compared with sintered-bottom results. J. L. P. McMahon describes experience at Pittsburgh Steel.

17-45. Inverted Arch Basic Brick Bottoms. H. M. Kraner. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 104-111; discussion, p. 112-114.

The evolution of design since 1936.

17-46. Fettling and Bottom Maintenance. J. E. Smith. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 114-115; discussion, p. 115-116.

Performance of several different refractories.

17-47. Progress Report—Basic Furnace Construction. A. K. Moore. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 262-264.

Experience at Steel Company of Canada on basic-end and basic-main-roof construction.

17-48. Progress Report on Basic-End Furnaces. Charles R. FonDersmith. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 264-268; discussion, p. 268-271.

Installation, cost data, and performance at American Rolling Mill Co. Appearance before and after campaigns. Report on basic refractories in German openhearth furnaces, by G. E. Seil.

17-49. Design and Construction of Plastic-Lined Doors. J. N. Hornak. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.*, v. 29, 1946, p. 271-279; discussion, p. 279-283.

Investigation was limited to the mechanical setup for holding the plastic material, the same plastic material being used throughout. Various designs tested and the condition of the linings after service. Several reports of the life of basic-rammed doors.

17-50. Progress in Silica Refractories. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.*, v. 29, 1946, p. 283-285.

Use of silica brick for openhearth roofs. High-silica mortars.

17-51. Progress in Mixer Linings. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.*, v. 29, 1946, p. 285.

Costs for sillimanite vs. first quality firebrick for steel ladle linings.

17-52. Relation of Insulation to Over-All Operating Economy. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.*, v. 29, 1946, p. 286-292.

Insulation of openhearth furnaces in relation to fuel economy, refractory consumption, air leakage, and over-all operating economy.

17-53. Special Refractories—Metal Melting. William H. Henson. *American Foundryman*, v. 11, May 1947, p. 64-70.

The various types and their properties.

17-54. Reactions of Different Clay Minerals With Some Organic Cations. R. E. Grim, W. H. Allaway, and F. L. Cuthbert. *Journal of the American Ceramic Society*, v. 30, May 1, 1947, p. 137-142.

Results of a fundamental study of the use of amines and other large organic cations in the production of lightweight insulating refractories. Selected samples of kaolinite, illite, and montmorillonite were washed free of replaceable bases, saturated with potassium ion, and then treated with various amine salts. This treatment reduced water-adsorbing capacity of the clays.

17-55. Reaction of Clays With Organic Cations in Producing Refractory Insulation. R. E. Grim, W. H. Allaway, and F. L. Cuthbert. *Journal of the American Ceramic Society*, v. 30, May 1, 1947, p. 142-145.

Since above reactions produce slips which shrink only slightly after casting and do not lose shape and porosity on drying or firing, the possibility of thus producing refractory insulation without final drawing to shape was investigated. Investigation of molding and other problems.

17-56. Method for Determining Tensile Properties of Refractory Materials at Elevated Temperatures. Joseph R. Bressman. *Journal of the American Ceramic Society*, v. 30, May 1, 1947, p. 145-152.

Development of equipment and technique for testing ceramic materials up to 2000° F. With this equipment, the tensile strength, stress-to-rupture characteristics, and modulus of elasticity of a sillimanite refractory were investigated.

17-57. Substitution of Domestic Minerals for India Kyanite: Part VI. Refractory Properties of Georgia Massive Kyanite. T. N. McVay and Hewitt Wilson. *Journal of the American Ceramic Society*, v. 30, May 1, 1947, p. 159-164.

Occurrence and mining problems of the Georgia material. Details of the preparation of refractories from it, and results of tests of the properties of the products.

17-58. Heat Treatment of Refractory Materials. (Continued.) *Refractories Journal*, v. 23, April 1947, p. 140-146.

Several German refractory plants and the techniques used in them. (Reprinted from Field Team Report B.I.O.S. 2065.)

17-59. Structural Design of Refractory and Heat Resistant Concrete. Part II. Methods of Reinforcing. *Industrial Heating*, v. 14, May 1947, p. 820, 822, 824, 826.

Basic design factors governing the use of refractory concrete made with calcium-aluminate cement. (To be continued.)

17-60. Minerals for Chemical and Allied Industries. Part X. Sydney J. Johnstone. *Industrial Chemist*, v. 23, May 1947, p. 303-311.

Metallurgical and chemical uses of limestone and lime. (To be continued.)

17-61. A Note on the Application of the Differential Thermal Analysis Method to Some Basic Refractory Materials. T. W. Howie and J. R. Lakin. *Transactions of the British Ceramic Society*, v. 46, Jan-Feb. 1947, p. 14-19; discussion, p. 19-22.

Application to magnesite, dolomite, and chromite products.

17-62. Alunite and Clays. J. O. Knizek and H. Fetter. *Transactions of the British Ceramic Society*, v. 46, Jan-Feb. 1947, p. 22-46.

Results of an extensive investigation of Mexican refractory clays containing alunite and natro-alunite. Use of thermal analysis in detecting the presence of the alunites in clays. Study of firing behavior showed that suitable additions of alunite to clay improve the bond, and raise the temperature of

the softening point. The apparent porosity of a clay-alunite mixture decreases as the concentration of alunite increases, and there is a corresponding increase in bulk density. 26 ref.

17-63. The Manufacture of Refractories and Information Concerning Their Use in the Iron and Steel Industry of Western Germany. *Refractories Journal,* v. 23, May 1947, p. 155-162.

Introductory article of series summarizes results of investigation of 14 German refractory plants and two steel plants. Refractories used at the Mannesmann Werke—blast furnaces, bessemer converters and openhearth furnaces. (Reprinted from F.I.A.T. Final Report No. 432.)

17-64. Various Refractory Subjects Highlight Present Problems at 49th American Ceramic Society Meeting. *Brick & Clay Record,* v. 110, June 1947, p. 64, 66, 68, 70, 72.

Abstracts of papers not included in May issue.

17-65. Development of Zirconia Resistant to Thermal Shock. Carl E. Curtis. *Journal of the American Ceramic Society,* v. 30, June 1, 1947, p. 180-196.

Effects on crystal stabilization and other properties of pure zirconia were determined for additions of CaO, MgO, BeO, ThO, and CeO in binary and ternary combinations. Several systems were found to produce complete stabilization. The discovery of such systems will allow use of zirconia for refractories in contact with molten metals and slags. Previously such use has been limited by its low resistance to thermal shock. 26 ref.

17-66. Report of Committee on Research. J. H. Koenig. *American Ceramic Society Bulletin,* v. 26, June 15, 1947, p. 192-198.

Research programs in refractories and whiteware sponsored by the U. S. Government and by private organizations. 20 ref.

17-67. Refractory Life in Side-Blown Converters. T. Bishop. *Metal Progress,* v. 52, July 1947, p. 105.

Results of a survey of 22 firms conducted in Britain. For small vessels, monolithic linings are preferred; for large, brick linings. Experiences with charging sand with iron.

17-68. Heat Losses in Furnace Linings. J. D. McCullough. *Blast Furnace and Steel Plant,* v. 35, July 1947, p. 817-823.

Methods of determining the heat losses quickly and easily. Time-temperature gradients for furnaces insulated in different ways.

17-69. Basic Openhearth Furnace Refractories and Masonry. *Industrial Heating,* v. 14, July 1947, p. 1168, 1170, 1172.

Summarizes information presented at session of 30th Conference of the National Open Hearth Steel Committee of the A.I.M.E., Cincinnati. (To be continued.)

17-70. Relation of Refractory Economy to Combustion in Steel Mill Practice. E. N. Hower. *Industrial Heating,* v. 14, July 1947, p. 1174, 1176-1177.

Condensation of paper originally presented before 1946 Convention of the Association of Iron & Steel Engineers, Cleveland.

17-71. Synthesis of Magnesium Aluminate by the Alumothermal Method. R. L. Pevzner. *Comptes Rendus de l'Académie des Sciences de l'U.R.S.S.,* v. 55, no. 3, 1947, p. 233-235. (In English.)

An experimental investigation of a process for manufacture of the above spinel based on the Goldschmidt reaction. Details of a study of the structure of the material thus prepared.

17-72. Modern Refractory Materials. G. Fitzgerald-Lee. *Refractories Journal,* v. 23, June 1947, p. 199-202.

Types in use today; B. S. I. specifications; jointing materials; acid resisting refractories.

17-73. Carbon Hearths for Blast Furnaces. *Refractories Journal,* v. 23, June 1947, p. 210-212.

German practice as reported in B.I.O.S. Final Report No. 819.

17-74. Heat Losses in Furnace Linings. J. D. McCullough. *Petroleum Refiner,* v 26, July 1947, p. 112-117.

Methods of determining losses because of heat stored in and conducted through furnace linings.

17-75. Refractories in the German Iron and Steel Industry. *Iron Age,* v. 160, Aug. 14, 1947, p. 66.

Outline of German practice as reported in *Iron and Coal Trades Review,* March 14, 1947.

17-76. Refractories. Hobart M. Kraner. *Ceramic Age,* v. 50, July 1947, p. 45-48.

Developments over past 25 years.

17-77. Progress Report on Carbon Linings for Blast Furnaces. V. J. Nolan. *Refractories Journal,* v. 23, July 1947, p. 256-262.

Thirteen blast furnaces in operation in the United States have hearths built completely of carbon blocks or bricks, or lined with courses of shaped carbon. Since some of these hearths have been in blast for as long as fifteen months, a number of questions relative to their durability and operating characteristics can now be answered.

17-78. The Stability of Carbon Bricks in Carbon Monoxide. T. W. Howie and J. Mackenzie. *Transactions of the British Ceramic Society,* v. 46, July 1947, p. 161-173; discussion, p. 173-176.

A study of the action of CO on experimental carbon bricks with additions of iron and iron oxide (Fe_2O_3) and on three commercial brands of brick.

17-79. Reactions Occurring in Refractory Materials Involving Ferrous Oxide and Magnesia. G. H. B. Lovell, G. R. Rigby, and A. T. Green. *Transactions of the British Ceramic Society,* v. 46, July 1947, p. 200-206.

Reactions of FeO with magnesium aluminate, silicate, and chromate were studied at 1400 °C. All three reactions are similar in that they involve mutual replacement between magnesium and ferrous ions. Appendix by W. F. Ford gives results of X-ray examination of the reaction products.

17-80. Workability Index of Fireclay Refractories. *Technical News Bulletin (National Bureau of Standards),* v. 31, Aug. 1947, p. 94-95.

Workability of a plastic refractory should be based on the amount of work required to reach maximum bulk density rather than on a deformation test. Need for standardization of the method of test.

17-81. Basic Ports and Roofs in European Openhearth Furnaces. Pierre Bettembourg. *Metal Progress,* v. 52, Sept. 1947, p. 403-410. (Translated from the French.)

The characteristics and construction and maintenance techniques for basic ports and roofs. Deals with chrome-magnesia brick only, and specifically with "Radex E", the type most widely used on the Continent. Use of basic refractory brick in openhearth furnaces has increased production while reducing fuel consumption and increasing the life of furnace linings.

17-82. Basic Openhearth Furnace Refractories and Masonry. Part II. *Industrial Heating,* v. 14, Sept. 1947, p. 1506, 1508, 1510.

A discussion at the recent 30th conference of the National Open Hearth Committee, A.I.M.E. Trends in bottom construction, checkers, and mixer linings. (Concluded.)

17-83. Conservation of Fuel Through Proper Selection of Furnace Refractories. *Industrial Heating,* v. 14, Sept. 1947, p. 1512.

Paper by J. D. McCullough presented to the school of industrial gas engineers conducted by the American Gas Association, Columbus, Ohio.

17-84. Fully Rammed Versus Partly Rammed Versus Dead-Burned Magnesite Bottoms. J. J. Golden. *Industrial Heating,* v. 14, Sept. 1947, p. 1514-1515.

Condensation of paper presented at recent National Open Hearth Conference of A.I.M.E., Chicago.

17-85. Eigenschappen en Toepassingen Van Vuurvast Materiaal. (Characteristics and Properties of Refractory Material.) G. Van Gijn. *Metalen,* v. 1, Aug. 1947, p. 217-224.

Various factors affecting refractory material, and desired properties for resistance to attack. Examination is made of the suitability of individual refractory materials when used in the foundry.

17-86. Special Refractories. William H. Henson. *Refractories Journal,* v. 23, Sept. 1947, p. 326-337.

Reprinted from *American Foundryman,* May 1947. (Item 17-53.)

17-87. Refractories. Raymond E. Birch. *Industrial and Engineering Chemistry,* v. 39, Oct. 1947, p. 1238-1242.

Recent developments in refractory materials and their use. 42 ref.

17-88. Carbon and Graphite. C. E. Ford. *Industrial and Engineering Chemistry,* v. 39, Oct. 1947, p. 1202-1204.

Recent developments in use of the above both in chemical and in metallurgical industry. 34 ref.

17-89. Permeability Data on American Refractories. D. O. McCreight. *Industrial Heating,* v. 14, Oct. 1947, p. 1734, 1736, 1738, 1740.

Permeability determinations were made on refractory brick by measuring the flow of air through the brick under a definite applied pressure. Apparatus and procedure for fireclay, high-alumina, silica, basic, and insulating brick. (Condensed from paper presented at 49th Annual Meeting, American Ceramic Society, Atlantic City, N. J., April 1947.)

17-90. Cheap Oxygen—Will It Change Clay Products and Refractories Industry? *Brick & Clay Record,* v. 3, Oct. 1947, p. 62.

Synthetic gas from cheap coals, changes in processing of clay ware, and new requirements for refractories are among the indicated trends.

17-91. How U. S. Fireclay Deposits Occurred and Their Properties Developed. Part II. J. O. Everhart. *Brick & Clay Record,* v. 3, Oct. 1947, p. 60-61.

Typical chemical analyses of representative fireclays and the firing behaviors of several fireclay samples.

17-92. To Test Basic Refractories and Oxygen in Openhearth at Higher Heat. *Brick & Clay Record,* v. 3, Oct. 1947, p. 55-57, 59.

Details of the construction of an experimental 122-ton openhearth furnace by Carnegie-Illinois at South Chicago to determine the advantages of basic linings when oxygen is used. In addition it will provide an opportunity for comparing the characteris-

tics of various kinds of refractories. Experiments will include the use of oxygen in different kinds of burners, and the use of preheated compressed air for atomization of oil. Studies will be made of flame radiation, effects on furnace efficiency of the higher temperatures permissible with basic linings, and of possible new steelmaking procedures.

17-93. Studies Steelmaking Procedures in All-Basic Openhearth. *Steel,* v. 121, Nov. 3, 1947, p. 112, 115-116, 118.

See item 17-92.

17-94. All-Basic Openhearth Furnace to Be Used for Experimental Purposes. *Blast Furnace and Steel Plant,* v. 35, Oct. 1947, p. 1209-1212.

See item 17-92.

17-95. All-Basic Openhearth Furnace Built by Carnegie-Illinois. *Industrial Heating,* v. 14, Oct. 1947, p. 1721-1722, 1724, 1726, 1728, 1730, 1732.

See item 17-92.

17-96. Design of All-Basic Openhearth. *Iron and Steel Engineer,* v. 24, Oct. 1947, p. 78-83.

See item 17-92.

17-97. Properties of Refractory Materials. *Industrial Diamond Review,* v. 7, Oct. 1947, p. 299.

A tabulation covering 17 materials. 18 ref.

17-98. Need of Newer Refractories for Higher Temperatures Stressed at A.C.S. Meeting. *Brick & Clay Record,* v. 3, Nov. 1947, p. 62, 64, 66.

Summaries of following papers presented at American Ceramic Society, Refractories Division Symposium, Bedford, Pa., Oct. 10, 1947: Introduction to the study of the refractory oxides, by Ray E. Birch. Simple oxide porcelains for jet planes and projectiles, by R. F. Geller. Properties and uses of mullite and pure alumina refractories, by G. Bickley Remmey. Zircon and zirconia refractories, by C. E. Curtis and E. Thomas. Carbon as a refractory material, by F. B. Thatcher.

17-99. Carbon and Graphite Electric-Furnace Electrodes. T. L. Nelson. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 5-12; discussion, p. 12-13.

Factors in choosing and handling of electrodes; recent advances in electrode joints.

17-100. The Manufacture of Refractories and Information Concerning Their Use in the Iron and Steel Industry of Western Germany. (Continued.) *Refractories Journal,* v. 23, Oct. 1947, p. 376-380.

Description of Bochumer Verein Gusstahlfabrikahon A. G. including personnel, general equipment, and blast furnaces. The metal mixers. (To be continued.)

17-101. Structural Design of Refractory and Heat-Resistant Concrete. Part III: Practical Industrial Applications. (Concluded.) *Industrial Heating,* v. 14, Nov. 1947, p. 1892, 1894, 1896, 1898, 1900, 1902-1903.

Application of ducts, flues, and stacks; stack linings; combustion-chamber arches; in the byproduct coke-plant; and miscellaneous coke-plant maintenance uses.

17-102. Design of Carbon Hearths and the Results Obtained at the Carrie Furnace. C. J. Fleisch. *Blast Furnace and Steel Plant,* v. 35, Nov. 1947, p. 1359-1360.

See item 17-104.

17-103. Carbon Hearth Installations at Homestead. C. J. Fleisch. *Iron and Steel Engineer,* v. 24, Nov. 1947, p. 93-96.

See item 17-104.

17-104. Progress Report on Blast Furnace Carbon Hearths. C. J. Fleisch. *Steel,* v. 121, Nov. 17, 1947, p. 116, 118.

Results at Carnegie-Illinois Steel Corp. show that new design of tapping hole affords increased strength and large variation in drilling angle. Carbon-hearth furnaces give more uniform size of casts and respond within two to four casts after a bank to provide suitable hot metal for the openhearth. (Presented at meeting of Blast Furnace and Coke Oven Assoc., Cleveland, Oct. 10, 1947.)

17-105. Carbon Mold Plugs in Alloy Steel Production. Harry F. Walther. *Iron Age,* v. 160, Nov. 27, 1947, p. 70-73.

Use of 45,000 carbon mold plugs in the production of large alloy-steel ingots. Advantages are: lengthened mold life, absence of spalling, elimination of refractory inclusions, avoidance of soaking-pit contamination, and minimizing of leakage and other pouring difficulties. A comparison of carbon pickup of carbon and ceramic plugs.

17-106. Refractories and Forging Costs. H. J. Shaner. *Industrial Gas,* v. 26, Dec. 1947, p. 14, 30.

Refractories used in the lining of forging furnaces and their effect on forging costs.

17-107. Iron Oxide Conversion, a Previously Unrecognized Cause of Refractories Destruction. C. Burton Clark and C. L. Thompson. *Industrial Heating,* v. 14, Dec. 1947, p. 2056, 2058, 2060, 2064.

Laboratory experiments have shown that repeated alternate oxidizing and reducing conditions of 2200 and 2400° F., as well as repeated changes in temperature above and below 2500° F. in an atmosphere of air, cause a spongy growth in iron oxide. This growth is apparently the result of repeated conversions of one oxide to an-

other, and may have a destructive effect where iron oxide is deposited on furnace refractories. (Condensed from paper presented at 49th Annual Meeting of American Ceramic Society, Atlantic City, N. J.)

17-108. Carbon Hearths for Blast Furnaces. *Iron Age,* v. 160, Dec. 18, 1947, p. 72-76.

Construction details of five carbon-block blast furnace hearths, together with some notes on operating experience with carbon linings.

17-109. Special Brick Shapes for Cupola Refractories. H. M. Hazeltine. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 264-265.

Previously annotated in R.M.L., v. 2, 1945.

17-110. Refractories for Electric Melting in the Ferrous Foundry. E. K. Pryor and L. R. Burke. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 379-385.

Previously annotated in R.M.L., v. 3, 1946.

SECTION XVIII

HEAT TREATMENT

18-1. A Practical Approach to Cold Treatment of Steel. Orlo E. Brown. *Materials & Methods,* v. 24, Dec. 1946, p. 1445-1449.

Methods suggested by which manufacturers of hardened steel parts can determine for themselves whether or not cold treatment will improve their product. With S.A.E. and similar steel, the checking is accomplished by simple shop tests. If the type of metal is such as to be susceptible to supercooling or supersaturation, then the hardness is checked. When the apparent hardness and Rockwell C hardness do not agree, the probability is that cold treatment will be beneficial. Actual trial will tell if the improvement obtained offsets the cost of treatment.

18-2. Straightening a Large Cast Steel Gear. *Linde Tips,* v. 26, Jan. 1947, p. 17-18.

Procedure used to flame-straighten the warped intermediate shaft gear for a 3¾-yd. electric shovel.

18-3. Steel Casehardening Process Speeds Production. Arthur Q. Smith. *Industrial Gas,* v. 25, Dec. 1946, p. 20, 22, 34.

Chapmanizing process involves addition of nitrogen to iron-base alloys by heating the metal in presence of a nitrogenous material. The case is extremely hard but sufficiently ductile. Equipment required.

18-4. Le Recuit de La Malleable a Coeur Blanc Par un Melange Gazeux. (Decarburization of White Cast Iron by Means of Gaseous Mixtures.) Gabriel Joly. *Fonderie,* Oct. 9, 1946, p. 335-343.

Necessity of using electric and gas furnaces with controlled atmospheres, since use of such furnaces decreases expenses considerably and results in a higher quality and more uniform product.

18-5. Gaseous Annealing of White-Heart Malleable Castings. P. F. Hancock. *Foundry Trade Journal,* v. 80, Nov. 28, 1946, p. 309-316.

At present, malleable castings are annealed while packed in iron ore in heavy cans. New process described makes it possible to eliminate cans and ore, reduces time of process from several days to 20 to 30 hr. Over-all operating costs are greatly reduced and working conditions are improved.

18-6. Some Investigations on the Heat Treatment of Sheet Steel for Cold Pressing. (Continued.) J. Yourtaieff. *Sheet Metal Industries,* v. 23, Dec. 1946, p. 2329-2334.

Structural and mechanical property changes taking place in cold worked sheets from killed steel in the course of annealing at different temperatures. Pieces reduced less than 20% should be normalized (annealed at 925° C.) if they are to be subjected to repeated shocks or alternating stresses; pieces reduced more than 20% may be annealed at lower temperatures regardless of ultimate service. Begins discussion of low-temperature annealing. (To be concluded.)

18-7. Continuous Strip Annealing. E. J. Seabold. *Iron and Steel Engineer,* v. 23, Dec. 1946, p. 74-83; discussion, p. 83-86.

Furnace design for strip annealing with an improved cycle of heat treatment and with thermal efficiency increased by heat exchange between strip leaving the furnace and the entering strip. The design and operation of the furnace and the annealing process shown by means of detail drawings. Setup used to check the temperature of any part of the cycle. Processing costs are calculated. Advantages are: speed of processing, no increase in costs over batch methods, and combination of cleaning with annealing.

18-8. Production Carburizing. Lester F. Spencer. *Steel Processing,* v. 32, Dec. 1946, p. 797-808.

Carburizing procedures; methods of carburization; pack carburizing; protection from carburization. (To be continued.)

18-9. Contribution a la Connaissance des Alliages Al-Zn-Mg-Cu-Cr. (Contribution to the Study of Al-Zn-Mg-Cu-Cr Alloys.) *Comptes Rendus,* v. 223, Nov. 4, 1946, p. 727-729.

A series of test specimens of alloys containing 8.5% Zn, 1.5% Cu, 2.5% Mg, 0.25% Cr, 0.07% Fe, 0.03% Si, balance Al, has been investigated by means of X-rays to determine the dependence of their strength properties on the quench temperature.

18-10. Potential Hazards in Molten Salt Baths for Heat Treatment of Metals. *The National Board of Fire Underwriters Research Report* no. 2, 1946, 40 p.

The molten salt bath method of heat treatment; typical accidents and their causes; recommended precautions.

18-11. Induction Hardening of Steel. D. L. Martin and R. A. Gehr. *Steel,* v. 120, Jan. 13, 1947, p. 78-81, 114-115.

Factors determining successful use of induction hardening, problems that arise, and importance of generator power output on the heating rate of steel parts.

18-12. Isothermal Heat Treatment of Tools. E. F. Watson. *Machinery (London),* v. 69, Dec. 5, 1946, p. 729-730.

Effects produced by quenching; controlling change of structure; the isothermal process.

18-13. Automatic Continuous Heat Treatment. *Iron Age,* v. 159, Jan. 16, 1947, p. 63.

Savings in space, time, labor, and fuel, with uniformity of product treatment were realized in a recent installation in a drop forging plant for automatic continuous heating, quenching, washing and drawing of assorted steel forgings.

18-14. Subzero Treatment of Steels. G. H. Jackson. *Aircraft Production,* v. 8, Dec. 1946, p. 588-593.

Metallographic principles involved in high speed steels and high-alloy steels. Indicates that insufficient practical work has been carried out to substantiate claims of improved life in toolsteels, but that the use of low temperatures for alloy steels such as S.82 should be favorably considered by reason of the fact that dimensional stability, freedom from stress and increased hardness values of intricate shapes can be secured. 10 ref.

18-15. Induction Hardening of Steel. Part II. D. L. Martin and R. A. Gehr. *Steel,* v. 120, Jan. 20, 1947, p. 74-78.

Items to be considered such as coil design and quenching fixtures. (To be continued.)

18-16. Modern Heat Treating Methods in an Automobile Plant. Charles H. Wick. *Machinery,* v. 53, Jan. 1947, p. 141-149.

In the Buick Motor Division of G.M. all of the Buick motor and differential parts are heat treated in a central area which occupies 47,000 sq.ft. of factory floor space. Normalizing, carburizing, hardening, and tempering operations are performed in 64 heat treating furnaces having capacities of 400 to 4000 lb. per hr. Furnaces range from relatively small batch-type tempering furnaces, 20 in. in diameter x 36 in. deep, to hardening furnaces having a hearth area 4 ft. wide x 33 ft. long and a height from hearth to arch of 30 in.

18-17. Bits and Pieces. *Metal Progress,* v 51, Jan. 1947, p. 85-87.

Brief items include: "Size Stabilization" by Avery C. Jones (treatment of parts at −150° F. accelerated the austenite⟶martensite transformation, thus stabilizing dimensions); "To Avoid Staining Around Cracks" by Victor Kappel (technique prevents acid staining of macrograph specimens); "Hot Hardness Testing" by Otto Zmeskal (simplification of Rockwell hardness units for routine work); "Identification of Nickel or Monel Wire in a Woven Wire Screen" by Robert L. Hackney (nondestructive chemical test); and "Etching Reagent for Stainless Steel" by Robert A. Huseby (aqua regia saturated with $CuCl_2$).

18-18. Cooling Rates of Plates and Rounds. A. L. Boegehold and E. W. Weinman *Metal Progress,* v. 51, Jan. 1947, p. 96-B.

Data sheet shows revised average cooling rates at various positions on Jominy end-quenched specimens made of 1045, 9420 and 9445 steel, compared with values given on S.A.E. standard chart; correlation of cooling rates and times between Jominy bar and plates and bars of various diameters. (Taken from O.S.R.D. report on "Heat Treatment of National Emergency Steels for Use in Tanks, Combat Cars, Gun Mounts and Other Ordnance Materiel".)

18-19. Induction Hardening of Steel. D. L. Martin and R. A. Gehr. *Steel,* v. 120, Jan. 27, 1947, p. 78-80, 82, 84, 86, 89, 107.

Various production fixtures that assure uniformity of product, together with a complete discussion on metallurgical aspects of hardening steel based on the transformation of austenite.

18-20. Heat Treating Aluminum Aircraft Parts in Salt Baths in Woodall Industries Plant. *Industrial Heating,* v. 14, Jan. 1947, p. 56, 58, 60.

Heat treating equipment and procedures.

18-21. Casehardening Wrist Pins With Induction Heat. T. E. Lloyd. *Iron Age,* v. 159, Jan. 30, 1947, p. 54-56.

Casehardening wrist pins by high frequency induction heating with a newly designed 20-kw., 450-kc. unit. Use of this method is expected to permit use of thinner walled pins formed of tubing and to give a production rate in hardening of 1000 2.75-in. long pins per hr.

18-22. New Short-Time Aging Practice for 75S Aluminum Alloy Sheet. J. A Nock, Jr. and A. C. Wooll. *Iron Age,* v. 159, Jan. 30, 1947, p. 57-59.

A new aging treatment for 75S aluminum sheet which permits the aging cycle to be completed during a single 8-hr. shift. In addition to a saving in time, this practice results in improved formability. Corrosion and corrosion cracking resistance are equal to results obtained by previously used aging practice.

18-23. Production Carburizing. Part II. Lester F. Spencer. *Steel Processing,* v. 33, Jan. 1947, p. 43-50.

Carburized steel considered as two steels in one—the high-carbon case and the low-carbon core. Possible heat treatments following carburizing. Tables show some properties to be expected from carburized steels.

18-24. Controlled Atmospheres From City Gas for the Heat Treatment of Steels. Ivor Jenkins. *Metals Technology,* v. 14, Jan. 1947, T. P. 2121, 58 p.

Design of the gas-generating equipment and experimental investigation of the factors influencing the composition of the gas and of problems in the use of the atmosphere for heat treatment of steels. 26 ref.

18-25. Caustic Soda as a Quenching Medium for Steel. Kenneth Rose. *Materials & Methods,* v. 25, Jan. 1947, p. 75-77.

Effects of concentration and how the process works; what its advantages are.

18-26. Methods of Countering Internal Stresses in Welded Assemblies. G. A. Nikolaev. *Welding,* v. 15, Jan. 1947, p. 37.

Various methods were evaluated. Annealing at 600 to 650° C. was found to be the most effective method. (Abstracted from *Avtogennoe Delo,* no. 10, 1945.)

18-27. Induction Hardening of Steel. Part IV. D. L. Martin and R. A. Gehr. *Steel,* v. 120, Feb. 3, 1947, p. 100-101, 148, 150, 152, 154-155.

Martensite formation and the influence of alloys on hardenability, martensite tempering, internal stresses and quenching cracks. (To be continued.)

18-28. Heat Treating and Machining Magnesium Alloys. Allen G. Gray. *Steel,* v. 120, Feb. 3, 1947, p. 102-104, 106.

Solution, aging and stabilizing heat treating techniques, together with the various factors affecting machining.

18-29. High-Frequency Induction Heating. E. May. *Machinery (London),* v. 70, Jan. 9, 1947, p. 45-49.

High-frequency power sources; choice of equipment; cost of surface hardening. (To be continued.)

18-30. Modernized Setup Cuts Heat Treat Costs. John G. Gurney. *Iron Age,* v. 159, Feb. 6, 1947, p. 64-67.

Organization of an efficient heat treating layout by a machine tool manufacturer to produce parts economically and high in quality. Methods of cutting costs by saving time and physical energy of workmen, as well as means of obtaining metallurgical uniformity of product. The duties of a clerk-inspector and his importance in promoting efficiency in the heat treating department.

18-31. Some Investigations on the Heat Treatment of Sheet Steel for Cold Pressing. (Concluded.) J. Yourtaieff. *Sheet Metal Industries,* v. 24, Jan. 1947, p. 85-89.

Conclusions regarding soaking time. Normalizing and low-temperature annealing treatment.

18-32. Controlled Heat Treating. *Western Machinery and Steel World,* v. 38, Jan. 1947, p. 90-93.

Equipment and methods employed at Dexter Metal Treating Co.

18-33. Controlled Annealing of Strain Hardened Aluminum Alloys. P. W. Boone and David Lewis II. *Aluminum and Magnesium,* v. 3, Jan. 1947, p. 8, 20.

Partial annealing is entirely practical, and final properties of the material can be closely controlled by proper selection of annealing temperature and time of treatment. Table lists the results of tensile tests on commercial 52S½H aluminum sheet after various annealing procedures.

18-34. Advancements in the Art of Heat Treating Aluminum. James F. Carland and P. R. Watson. *Aluminum and Magnesium,* v. 3, Jan. 1947, p. 9-11, 19, 22.

Some of the interesting and unusual features developed in heat treating installations influenced by more strict temperature control requirements for furnaces, new controls applied to the quenching process and improvements made in the quenching process to minimize distortion of thin sheet stock.

18-35. Liquid Nitriding Increases Tool Life. Geo. A. Roberts. *American Machinist,* v. 91, Feb. 13, 1947, p. 134-136.

Chip pickup and wear on high speed steel tools are materially decreased by nitriding. Taps, chasers, reamers, form tools and broaches are most adaptable.

18-36. Beryllium-Copper Formed Parts; Advantages of Fixture Heat Treatment. *Product Engineering,* v. 18, Feb. 1947, p. 118-121.

Economies in assembled cost of stampings and coil springs possible through the use of fixture heat treated beryllium copper. Proper choice of materials and heat treating cycles. Tolerance ranges possible in fixture heat treated parts.

18-37. Stabilization of 18% Cr, 8% Ni Corrosion Resisting Steel. Samuel J. Rosenberg. *National Bureau of Standards Report No. 8,* Oct. 24, 1946, 6 p.

Results of the ninth and tenth phases of a test program involving study of susceptibility to intergranular attack of test steels as initially cold rolled (37½% cold reduction), followed by different preliminary treatment. Treatments utilized for tests were: Anneal 3 min. at 1975° F., water quench; with and without stabilizing treatment.

18-38. Centres de Cristallisation du Carbone de Recuit de la Malleable a Coeur Noir. (Temper Carbon Nodules Formed by Annealing of Malleable Black-Heart Iron.) Gabriel Joly. *Fonderie,* Nov. 1946, p. 375-385

This paper, based on Russian research, represents an important contribution to the study of factors directly influencing time of annealing. Also describes the factors which influence the number of temper carbon nodules and the manner in which they affect the mechanical properties of the product.

18-39. The Growing Use and Importance of Prepared Atmospheres. E. G. de Coriolis. *Industrial Heating,* v. 14, Feb. 1947, p. 226, 228, 230, 232, 234.

Fields of application of controlled atmospheres, especially in the metal industries. Special reference is made to carbon restoration, prevention of decarburization, gas quenching, dry cyaniding, and dewpoint control. (From a paper presented at the recent American Gas Association Sales Conference on Industrial and Commercial Gas in Toledo, Ohio.)

18-40. Temper Brittleness. W. S. Pellini and B. R. Queneau. *Western Metals,* v 5, Feb. 1947, p. 52-53.

Development of temper brittleness in two steels of widely different hardenability. Effect of time at temperature in the temper-brittle range determined for both steels. Results obtained by tempering isothermally compared with the embrittlement developed in the steels while cooling or heating through the same range of temperature. (Paper presented before American Society for Metals, November 1946.)

18-41. Quenching of Toolsteels. E. F. Watson. *Machinery (London),* v. 70, Jan. 30, 1947, p. 139.

Oil quenching, salt quenching and air blast.

18-42. A Model Which Shows Hardening and Annealing Mechanisms. Edwin C. Davis. *Metal Progress,* v. 51, Feb. 1947, p. 248-249.

Experiments with various sizes and curvatures of watch glass, various sizes of shot, and different methods of agitating the glass to demonstrate the processes of slip, slip interference, cold work, and annealing.

18-43. Cooling Time of Jominy Bars to Half-Temperature. Carl A. Liedholm. *Metal Progress,* v. 51, Feb. 1947, p. 266-267.

Observed values of half-temperature cooling times along Jominy bar and their relation to a curve calculated from a modified Gompertz equation.

18-44. Maximum Sizes of Bars of Required As-Quenched Center Hardness (H Steels). A. L. Boegehold. *Metal Progress,* v. 51, Feb. 1947, p. 272-B.

Hardenability tables for given percent of martensite, after oil and water quench, of various steels.

18-45. Heat Treating—Additions to Metallurgical Knowledge During the Past Year. G. K. Manning. *Metals Review,* v 20, Jan. 1947, p. 5-8.

Developments reported in the literature during 1946. These are discussed under the headings: austenite decomposition, induction heating, overheating, and carburization.

18-46. Products and Processes for Heat Treating. *Metals Review,* v. 20, Jan. 1947, p. 9, 11, 13, 15, 17, 19, 45.

Some recent innovations in equipment. List of names and addresses of manufacturers in this field.

18-47. Suspended Carburization. S. L. Widrig, John E. Reed, and O. E. Cullen. *Materials & Methods,* v. 25, Feb. 1947, p. 65-68.

Method for holding charges in gas carburizing furnaces up to 72 hr., eliminating furnace shutdowns for week ends.

18-48. Caustic Soda Solutions. *Materials & Methods,* v. 25, Feb. 1947, p. 123.

Table and graph to help make up solutions by weight to desired strengths, or to check solutions already made up, using a hydrometer reading in either specific gravity or Baumé degrees. Solutions used for quenching steel forgings and other work.

18-49. Precipitation Hardening. L. Sanderson. *Chemical Age,* v. 56, Feb. 1, 1947, p. 202-204.

Essential requirements; stability hardening; heat treatment; quenching media; formation of nuclei. (To be continued.)

18-50. Heat Treatment of High Speed Steels. Part I. Howard E. Boyer. *Steel,* v. 120, March 3, 1947, p. 110-113, 138, 140.

Fundamental information of practical value to heat treaters as well as

to the user of high speed steel tools. Results of an exhaustive study of the properties obtainable from three different types of high speed steels. (To be continued.)

18-51. Metals Plus Hydrogen. Howard C. E. Johnson. *Scientific American,* v. 176, March 1947, p. 116-118.
The various hydrides and their application to metal treating processes.

18-52. Heat Treatment of High Speed Steels. (Concluded.) Howard E. Boyer. *Steel,* v. 120, March 10, 1947, p. 92-95, 120, 123, 126.
Data related to the tempering operations and the physical changes involved. Transformation of austenite in most steels is completed in less time than some former investigations have shown; major portion of transformation takes place during heating to the tempering temperature.

18-53. The Izod Impact Strength of Heat Treated Alloy Steel. Walter Crafts and John L. Lamont. *Metals Technology,* v. 14, Feb. 1947, T. P. No. 2134, 15 p.
Study was conducted in order to develop a basis for estimating the Izod impact strength of partially hardened steel; based on test data derived from 24 heats from four producers.

18-54. Surface Hardening of Aluminum and Its Alloys. K. G. Robinson and B. W. Mott. *Metallurgia,* v. 35, Feb. 1947, p. 201-204
Work was carried out to produce a suitable surface layer of copper-rich constituent and, by careful control of conditions, a hard surface layer of good uniformity was produced.

18-55. The Interrupted Quench and Its Practical Aspects. Howard E. Boyer. *Steel Processing,* v. 33, Feb. 1947, p. 103-110.
Results of an investigation to determine causes of cracking of S.A.E. 52100 when martempered. Factors investigated were carburizing atmospheres; decarburizing atmospheres; overheating; underheating; effects of agitation in martempering bath; chemical composition of salt quenching bath; Ms point location; hardenability—martempering versus oil quenching; holding time in the martempering bath; cooling rate from martempering bath; percentage of retained austenite—martempering versus oil quenching.

18-56. Controlled Atmosphere Aids Bulova. Oliver Pritchard. *Industrial Gas* v. 25, March 1947, p. 7-9.
Controlled atmospheres used in the heat treating of watch parts.

18-57. Defiance Screw Machine Has Complete Heat Treating Department. *Industrial Gas,* v. 25, March 1947, p. 10-11.
Heat treating equipment at Defiance Screw Machine Products Co., Defiance, Ohio.

18-58. Gas Toughens the Tractor. William Helme. *Industrial Gas,* v. 25, March 1947, p. 14-16, 34.
Heat treating equipment and procedures used by International Harvester Co. in their Chicago plant, for manufacture of tractor parts.

18-59. Metal Heat Treating Equipment. Gordon Wheeler. *Machine and Tool Blue Book,* v. 43, March 1947, p. 206-208, 210, 212 214-216, 218, 220, 222-224, 226, 228.
Analyzes three methods of heat transfer—conduction, convection, and radiation—and the types of equipment designed to accomplish these methods of heat transfer, such as salt baths, lead baths, semimuffle and full muffle furnaces.

18-60. You Can Profit From Flame Hardening. *Industry and Welding,* v. 21, March 1947, p. 48-50, 52.
Important factors in flame hardening; new applications where flame hardening can be used to advantage.

18-61. High-Hydrogen Atmosphere Intensifies Quench Cracking Tendency. C. A. Liedholm. *Metal Progress,* v. 51, March 1947, p. 414-419.
Laboratory tests and confirming evidence from production heat treating experience which have led to the conclusion that hydrogen content of a reducing furnace atmosphere is a tremendously potent factor in quench cracking—the more so, the higher the carbon content of the steel or carbon pressure of the atmospheres, or the greater the severity of the quench. Experiments have resulted in the development of a test method which has yielded results that have clarified formerly obscure relationships among quench cracking, carbon content, atmosphere, and quench delay. Background information concerning the product of manufacture, the quenching method, and the materials involved.

18-62. Reducing Distortion in Case-hardened Nickel-Chromium Gears. C. A. E. Wilkins. *Metal Progress,* v. 51, March 1947, p. 441.
A successful heat treating and cooling schedule involves cooling in air from 1560 to 1400° F. and oil quench.

18-63. Heat Treating Schedules. J. Edwin Burkhardt. *Metal Progress,* v. 51, March 1947, p. 442.
Revised schedules for four aluminum alloys permit substantial time saving.

18-64. On-the-Job Annealing. *Metal Progress,* v. 51, March 1947, p. 443.
Flame of gas torch directed at work being spun is controlled by foot pedal.

18-65. Attempts to Accelerate the Nitriding of Steel. *Engineer,* v. 183, March 7, 1947, p. 194.

Critically reviews work of Kunze and and of Bennek and Rüdiger reported in *Archiv für das Eisenhüttenwesen* in 1944; and of Jones who developed two-stage nitriding in the U. S.

18-66. Continuous Hardening, Quenching, Washing, Drawing Forgings. *Steel,* v. 120, March 24, 1947, p. 84, 86.

How drop forgings are continuously heat processed from hardening to drawing in an automatic installation based on idea of synchronizing movement through all operations in a predetermined, fully mechanical cycle without intermediate manual handling.

18-67. Mass Production Heat Treating. *Steel,* v. 120, March 24, 1947, p. 88, 90.

Flexibility possible in modern equipment is illustrated by special gas carburizing and carbo-nitriding installations.

18-68. Salt Baths for Metals. Edwin Laird Cady. *Materials & Methods,* v. 25, March 1947, p. 99-114.

Salts used for casehardening, through hardening, quenching, and descaling ferrous metals; annealing nonferrous metals; soldering and brazing; and heating metals for forming. Information on various current uses for salt baths.

18-69. Fixture for Handling Work in Heat Treat Furnace. Stanley Lapinski. *Materials & Methods,* v. 25, March 1947, p. 133.

Fixture consists of yoke provided with a special handle that controls the revolution of the swiveling lift-rods. The lower or grid end of these lift-rods is bent to a 90° angle or hook, so that they will fit under the grid. Grid has clearance pads on the underside which provide clearance for the movement of the hook part on the lift-rods. Complete fixture carrying the work can be lowered into the furnace work chamber by means of an overhead crane or hoist, and the lifting yoke and swiveling lift-rods disengaged, and removed. Thus, only the grid and actual work load remain in the furnace.

18-70. Controlled Furnace Atmospheres. A. G. Hotchkiss. *Steel Processing,* v. 33, March 1947, p. 151-156, 179.

Atmospheres preventing oxidation and atmospheres preventing carburizing and decarburizing. (To be continued.)

18-71. Changes in Size and Toughness of High-Carbon High-Chromium Steels Due to Subzero Treatments. L. E. Gippert and G. M. Butler, Jr. *Steel Processing,* v. 33, March 1947, p. 175-178.

Subzero treatment of these steels during the hardening operation causing considerable expansion within the metal. Some data on impact tests. Three common types of high-carbon high-chromium die steel were used in study.

18-72. Don't Overlook "Cold Treating." G. M. Butler. *Steel Horizons,* v. 9, no. 2, 1947, p. 10-12.

Application of subzero treatment to three high-carbon high-chromium die steels which have been found particularly responsive to this chilling. Details of the technique used.

18-73. Tool Steels. Part III. L. Sanderson. *British Steelmaker,* v. 13, March 1947, p. 147-150.

Instructions for the heat treating and annealing of the different types of high speed and special alloy tool steels. (To be continued.)

18-74. Durcissement Superficiel des Aciers par Diffusion Intersolide Suivie de Nitruration. (Superficial Hardening of Steels by Means of Intersolid Diffusion Followed by Nitriding.) Jean-Dominique Venturini. *Comptes Rendus,* v. 224, Jan. 13, 1947, p. 118-120.

Proposes to increase the surface hardness of plain carbon steels by intersolid diffusion at temperatures in the range 850 to 950° C., by placing in contact with steels containing ferro-aluminum or other ferro-alloys with titanium, molybdenum, tungsten, and vanadium, followed by nitriding.

18-75. Logging Trailers That Can Take It. *Linde Tips,* v. 26, April 1947, p. 50-51.

How flame hardening doubles life for half-tracks. Three flame hardening methods used.

18-76. Tratamentos Termicos Comerciais. (Commercial Heat Treatments.) Vicente Chiaverini. *Boletim da Associacao Brasileira de Metais,* v. 3, Jan. 1947, p. 117-141; discussion, p. 141-142.

The various methods and equipment used in heat treatment of metals and their most common applications. A short review of the Heat Treatment Symposium of the Institute de Pesquisas Technologicas. 11 ref.

18-77. Induction Heating. (Concluded.) E. May. *Iron and Steel,* v. 20, March 1947, p. 117-120.

Machines for surface hardening, progressive hardening, brazing and soldering. How and where they may be used.

18-78. Principles of High-Frequency Heating. R. Smith. *Welding,* v. 15, March 1947, p. 108-115.

The principles of high-frequency heating, the types of plants employed and the design of the heating coils. Technique for various soldering and brazing applications.

18-79. High-Frequency Induction Treatment and Its Application to Ferrous

Metals. R. J. Brown. *Sheet Metal Industries,* v. 24, March 1947, p. 598-602.
Deals only with surface heating. Basic electrical principles of induction heating; types of generators; spark-gap and electronic generators; economies of induction heating; power concentration; and inductor systems. (To be concluded.)

18-80. Martempering. *Machinery (London),* v. 70, March 13, 1947, p. 265-266.
The process and its function.

18-81. Subzero Temperatures in Treating and Assembling Metal Parts. G. B. Olson. *Machinery,* v. 53, April 1947, p. 149-156.
How subzero temperatures are used to further harden steels after heat-treatment, to retard age hardening of aluminum, to shrink-fit parts for assembly and to cool tools during metal-cutting operations.

18-82. Heat Treating Aircraft Engine Parts at Pratt & Whitney Kansas City Plant. Part III. *Industrial Heating,* v. 14, April 1947, p. 557-558, 560, 562, 564, 566.
Pit-type carburizing furnaces and auxiliaries, oil-type tempering furnaces, an electric nitriding furnace, and miscellaneous equipment.

18-83. Modified Isothermal Treatments Minimize Distortion. O. E. Brown. *Iron Age,* v. 159, April 17, 1947, p. 54-56.
Heat treatment cycles for two carburized nickel steel parts, a herringbone pinion, and a gear having a light web and a hollow shaft. Isothermal treatments utilized, and modifications of present conventional practice have been successful in holding distortion to an exceptionally low value with no sacrifice in surface hardness. Core hardness has also been controlled without affecting the case.

18-84. Contribution a l'Etude des Aciers a Structures Intermédiares Obtenues par Trempe Etagee. (Contribution to the Study of Steels With Intermediate Structures Produced by Interrupted Quenching.) Georges Delbart and Ruben Potaszkin. *Revue de Métallurgie,* v. 43, March-April 1946, p. 84-94.
Effects of interrupted quenching and oil quenching on the structure and mechanical properties of a Cr-Mo steel containing 0.30% C, 2% Cr, and 0.5% Mo. Tabular data and diagrams are presented for four critical temperatures: 300, 400, 500, and 650° C.

18-85. High Frequency Induction Treatment and Its Application to Ferrous Metals. (Concluded.) R. J. Brown. *Sheet Metal Industries,* v. 24, April 1947, p 793-796, 809.
Time of heating; quenching; steels suitable for high frequency treatment; properties of treated steels; other applications of high frequency heating.

18-86. Nitralloy Steels and the Nitriding Process. R. W. Allott. *British Steelmaker,* v. 13, April 1947, p. 180-186.
A brief history of the process; technique and advantages over previous methods of casehardening. (To be continued.)

18-87. Toolsteels. Part IV. L. Sanderson. *British Steelmaker,* v. 13, April 1947, p. 192-195.
Heat treatment of special alloy toolsteels. (To be continued.)

18-88. Recent Improvements in Cover Annealing. A. J. Fisher. *Iron and Steel Engineer,* v. 24, April 1947, p. 53-62; discussion, p. 63-64.
Annealing of sheets and tin plate originally was done by direct firing, without use of prepared atmospheres; however, with the advent of cold strip mills, radiant-tube furnaces were introduced. Repair costs were high, hence direct firing has been reintroduced, using specially designed burners and protective coatings developed for the inner covers of the furnaces. Details of the tin-plate coil bases used, the furnace instrumentation, and preparation of the furnace atmosphere.

18-89. Controlled Atmospheres for Magnesium Alloy Heat Treatment. Frank Allen. *Light Metals,* v. 10, April 1947, p. 169-172.
The theory and practice of protective atmospheres and some shortcomings of the purely academic approach.

18-90. Planning Heat Treat Cycles to Avoid Production Delays. J. Edwin Burkhardt. *Materials & Methods,* v. 25, April 1947, p. 157.
Method of aging four alloys together, at 350° F. for 8 hr. or 340° F. for 10 hr., saves at least 40 hr. of furnace time each week, and eliminates the need for using other furnaces.

18-91. The Relationship of the Growth Exhibited on Nitriding to the Microstructure of the Nitrided Specimen. Part I. Lester F. Spencer. *Steel Processing,* v. 33, April 1947, p. 227-231, 239, 242, 245-246.
Possibility of minimizing growth by varying the heat treatment prior to the nitriding process. The final microstructures obtained with a variety of prior heat treatments; study of nitrided structure at high magnifications; characteristics of nitrided case.

18-92. Heat Treatment and Aging 61S Sheet. J. A. Nock, Jr. *Iron Age,* v. 159, April 24, 1947, p. 48-54.
Effects of solution heat treating temperatures, room-temperature aging, artificial-aging temperatures, interval of room-temperature aging prior to artificial aging, and reheating of heat treated material, on physical properties of this alloy. Corrosion resistance.

18-93. Phosphor Bronze Production Increased. Arthur Q. Smith. *Industrial Gas*, v. 25, April 1947, p. 12-13, 30.

Fabrication and finishing operations of Phosphor Bronze Smelting Co., Philadelphia, for producing rods, rounds, hexagons and squares; sheet and strip; and wire. Heat treating equipment.

18-94. Efficient Wire Rope Production. Gerald Eldridge Stedman. *Industrial Gas*, v. 25, April 1947, p. 16-17.

Technique of Union Wire Rope Corp., Kansas City, Mo. Equipment for patenting, cleaning, baking, galvanizing.

18-95. Heat Treating Fasteners by the Million. Herbert Chase. *Steel*, v. 120, May 5, 1947, p. 104-106, 148.

Integrated setup designed to heat treat, clean, and apply finish to small stamped parts in batches ranging from a few hundred up to hundreds of thousands.

18-96. Basic Requirements of Materials for Induction Hardening. Russell H. Lauderdale. *Product Engineering*, v. 18, May 1947, p. 110-115.

Key factors for obtaining best results from induction hardening including selection and processing of steels, power requirements, desirable initial microstructure, size and shape of parts, carbon content of steel, control of dimensional changes, and proper processing of parts.

18-97. Improvised Supercooling Unit. *Machinery*, v. 53, May 1947, p. 153.

Unit was constructed by cutting a 4-in. high section from the top of an empty 55-gal. oil drum. The bottom of this drum was lined with insulating refractory, and the openings between the insulating bricks were filled with powdered silocel. The remainder of the inside wall of the drum was also lined with insulating refractory brick.

18-98. Tooling Requirements for Induction Heating. Otto Weitmann. *Machinery*, v. 53, May 1947, p. 167-170.

Some installations engineered by Lepel High Frequency Laboratories.

18-99. Induction Hardening Steel Bars at J. & L. John F. Wilson. *Iron Age*, v 159, May 15 1947, p. 44-46.

Heat source, special bar handling equipment and processing steps.

18-100. Stabilizing Aluminum Castings. Avery C. Jones. *Metal Progress*, v. 51, May 1947, p. 775-776.

How cold treating solved a difficult production problem in the manufacture of hydraulic valves for aircraft.

18-101. Tempering of Toolsteels. Part I. Morris Cohen. *Metal Progress*, v. 51, May 1947, p. 781-788.

Results of an extensive investigation of the tempering process which is shown to be the result of at least four factors. Transformation curves for 18-4-1 high speed steel; and the four stages of tempering as determined by the microscope, by X-ray diffraction and by use of a combined magnetometer and dilatometer. Effect of time at temperature on hardness changes.

18-102. The Relationship of the Growth Exhibited on Nitriding to the Microstructure of the Nitrided Specimen. Part II. Lester F. Spencer. *Steel Processing*, v. 33, May 1947, p. 297-303.

Effects of different heat treating and quenching procedures. (To be continued.)

18-103. Strip Annealing. E. J. Seabold. *Iron and Steel*, v. 20, May 1947, p. 197-200.

Low-cost continuous electric heat-treatment. (Condensed from paper presented at meeting of American Association of Iron and Steel Engineers.)

18-104. Austempered Cast Iron Serves as Cylinder Liners. C. W. Ohly. *Materials & Methods*, v. 25, May 1947, p. 89-91.

Minimum distortion, no decarburization and uniform hardness are claimed in using salt baths for heat treating thin-walled, cylindrical, iron-alloy parts.

18-105. Heat Treatment of Dies. E. F. Watson. *Machinery (London)*, v. 70, May 8, 1947, p. 491.

Techniques for dies for hot stampings and pressings, shearing and punching dies for steel sheets and pressings, dies for molded products, plastics and clays and extrusion dies and mandrels.

18-106. Bethlehem Expands Toolsteel Facilities. R. J. Knerr and H. C. Bigge. *Iron Age*, v. 159, June 5, 1947, p. 69-73.

New and improved facilities for heat treatment, rolling, and forging.

18-107. Heat Treatment of Some Chromium-Nickel Alloys. H. A. Campbell. *Iron Age*, v. 159, June 5, 1947, p. 74-79.

Effects of heat treatment on the physical properties of some chromium-nickel alloys, including 18-8 stainless. The behavior of some of the alloys in sheet and tube form, during conversion to parts or structures and under service conditions. Heat treating precautions. 20 ref.

18-108. Developments in the Applications of Controlled Atmospheres. I. Jenkins. *Metallurgia*, v. 36, May 1947, p. 23-27.

Heat treatment developments.

18-109. Lead Hardening. Bernard Thomas. *Metallurgia*, v. 36, May 1947, p. 28-30.

Technique of lead hardening and the life of lead pots. Quenching mediums and the use of the salt bath for tempering.

18-110. New Fields for Prepared Atmospheres. W. A. Darrah. *Industrial Gas,* v. 25, May 1947, p. 12-14, 31-32, 34.

Miscellaneous applications.

18-111. Experiments on Quenching Media. F. W. Jones and W. I. Pumphrey. *Journal of the Iron and Steel Institute,* v. 156, May 1947, p. 37-54.

In a search for a standard test for comparison of hardening properties of different quenching media, cooling rates were determined at the center of a silver cylinder. An attempt was made to correlate the cooling rates thus obtained with the hardnesses found in quenched 1½-in. cylinders of a high-carbon chromium-molybdenum steel. No simple method of correlation was apparent. Further quenching experiments were carried out with stainless steel cylinders of various diameters, and qualitative agreement was obtained between predictions based on cooling rates and experimental hardnesses in quenched cylinders of hardenable steels. 19 ref.

18-112. Annealing Salt for 18-8. Keith Whitcomb. *Steel,* v. 120, June 16, 1947, p. 86, 105-106, 109.

Results of experiments at Ryan Aeronautical which led to development of new and improved salt-bath annealing process for titanium or columbium-stabilized stainless used to conduct the exhaust gases from airplane engines. Results with five salt mixtures, of which only pure sodium carbonate was found to be entirely satisfactory.

18-113. Nitralloy Steels and the Nitriding Process. (Continued.) R. W. Allott. *British Steelmaker,* v. 13, May 1947, p. 240-245.

Resistance of nitrided surfaces to corrosion and their reduction of the failure-promoting tendencies of notches and surface scratches. The properties of Nitralloy and other nitriding steels, and certain pseudo-nitriding processes, such as cyanide-nitride casehardening. Nitriding developments during World War II; present research and future prospects.

18-114. Equalized Pressure Mixing in Automatic Atmosphere Generator. *Product Engineering,* v. 18, June 1947, p. 94-96.

Generator of atmosphere for bright hardening and brazing high-carbon steels. Methane, ethane, or butane gas are catalytically cracked to produce CO and H_2. The mixer-compressor unit.

18-115. Tempering of Toolsteels. Part II. Morris Cohen. *Metal Progress,* v. 51, June 1947, p. 962-968.

Dimensional stability that results from the tempering.

18-116. A New Method of Coil Annealing. H. H. Armstrong and F. F. Schlitt. *Iron and Steel Engineer,* v. 24, June 1947, p. 35-39; discussion, p. 40-43.

Technique, which has been reduced to commercial practice, for edge heating of coils of strip steel or tin plate. A much better rate of heat transfer is provided than for penetration through the laminations.

18-117. Deformation of Machine Steel Rings During Casehardening. J. E. Erb. *Steel Processing,* v. 33, June 1947, p. 347-349.

Test results show stress relieving prior to casehardening has little effect on final deformation results, and a considerable amount of shrinkage takes place on quenching after casehardening of a steel containing 0.18% C, 0.40% Mn, 0.40% P, 0.05% S, and 0.25% Si.

18-118. The Relationship of the Growth Exhibited on Nitriding to the Microstructure of the Nitrided Specimen. Part III. Lester F. Spencer. *Steel Processing,* v. 33, June 1947, p. 362-367, 369-370, 372-373.

Results of size and hardness measurements before and after nitriding. Structural changes. 29 ref. (Concluded.)

18-119. Heat Treating Aircraft Blades Made From Steel Tubing at American Propeller Corp. *Industrial Heating,* v. 14, June 1947, p. 916-918, 920, 922, 924, 926, 928, 952.

The different steps in the fabrication of a blade, with special reference to the heating and heat treating operations involved.

18-120. Methods for the Quenching of Steel. Part VII. Flood Quenching and Surface Quenching. M. H. Mawhinney. *Industrial Heating,* v. 14, June 1947, p. 930, 932, 934, 936, 938.

Flood quenching; surface hardening. (Concluded.)

18-121. Induction Hardens Trick Machine-Tool Parts. *American Machinist,* v. 91, July 3, 1947, p. 89-92.

How initial applications at Jones & Lamson result in rerouting of more than 175 standard jobs, plus solutions of special problems.

18-122. Quenching Media and Methods. Harold L. Flynn. *American Machinist,* v. 91, July 3, 1947, p. 105-116.

Structural changes on quenching; quenching media; quenching methods; quenching equipment.

18-123. Logging Trailers That Can Take It. *Western Machinery and Steel World,* v. 38, June 1947, p. 110-111.

Setups for oxy-acetylene flame hardening of parts.

18-124. Two Opinions on Conditions for the Successful High-Frequency Hardening of Steel. *Sheet Metal Industries,* v. 24, June 1947, p. 1196-1199.

Critical discussion by J. D. Jevons of article by R. J. Brown, in March and April issues. Author's reply.

18-125. Tool Steels. Part VI. L. Sanderson. *British Steelmaker,* v. 13, June 1947, p. 294-297.

Technology and applications of chromium-vanadium steels, and general recommendations for forging and heat treating of toolsteels. (To be continued.)

18-126. Aluminum Sand Casting Alloys. H. A. Quadt. *American Foundryman,* v. 11, June 1947, p. 39-43.

Effect of room temperature intervals between quenching and aging on properties. 12 ref.

18-127. Ingenious Steel Quenching Practices Developed by Farm Implement Makers. Kenneth Rose. *Materials & Methods,* v. 25, June 1947, p. 77-80.

Combination quenching-forming machines, rather complicated in design, which permit high production, close dimensional control, and other economies in heat treating.

18-128. What to Look for in the Metal Industries. O. E. Cullen. *Industrial Gas,* v. 25, June 1947, p. 15-16, 31-32.

Applications of prepared gas atmosphere.

18-129. Precipitation Hardening. Part III. L. Sanderson. *Chemical Age,* v. 56, June 7, 1947, p. 741-743.

Effect of precipitation hardening on aluminum alloys; procedures. (To be continued.)

18-130. The Dimensional Stability of a High-Duty Cast Iron. L. W. Nickols. *Machinery (London),* v. 70, June 12, 1947, p 623-624.

Ten bars were heat treated and annealed in different ways. Accurate length measurements were made each year for seven years.

18-131. Commercial Heat Treating Boosted by Centralized Furnaces. *Production Engineering & Management,* v. 20, July 1947, p. 60-62.

How excellent control of physical and metallurgical characteristics is obtained on intricate-shaped and odd-sized parts with salt-bath furnaces.

18-132. Longer Life for Wearing Surfaces. *Linde Tips,* v. 26, July 1947, p. 96-97.

Simple shot setup which flame hardens 350 tin-snip blades per hour.

18-133. Controlling Physical Properties by the Interrupted Quench. H. E. Boyer. *Iron Age,* v. 160, July 3, 1947, p. 49-54.

Three variations of interrupted quenching: austempering, martempering, and marquenching. Methods of varying martempering procedures whereby desired hardness and toughness properties can be predetermined, and its deformation characteristics as compared with conventional oil quenching methods. Data presented have been obtained primarily from S.A.E. 52100 steel, but principles can be applied to other types of steels with equally desirable results.

18-134. Gas Chemistry. Its Role in Metallurgy. O. E. Cullen. *Steel,* v. 121, July 7, 1947, p. 86-88, 120, 122, 124.

Carbon restoration, precise control of carbon-bearing gases for heat treatments, dry cyaniding, bright annealing of copper, and rapid heating for forging.

18-135. Planning the Forge Shop for High-Frequency Heating. George F. Applegate. *Steel,* v. 121, July 14, 1947, p. 84-86, 124, 127-128.

Plant layout and material handling methods. Advantages of high frequency heating.

18-136. Precipitation Hardening. Part IV. L. Sanderson. *Chemical Age,* v. 57, July 1947, p. 13-15.

The aging of duralumin; alloying of aluminum with manganese and silicon; precipitation hardening of copper-base alloys; ternary copper alloys; industrial uses. (To be continued.)

18-137. Various Types of Heat Treating Handled in One Installation. *Steel,* v. 121, July 21, 1947, p. 99, 142.

Facilities of Dayton, Ohio, plant of Dayton Forging & Heat Treating Co.

18-138. Convection Annealing Large Diameter Tin-Plate Coils. Walter F. Toerge. *Steel,* v. 121, July 21, 1947, p. 130, 132, 134, 137, 140.

Technique of applying heat to coil edges rather than transversely through laminations which reduces total bright annealing processing time to 34 hr. on 46-in o.d. coil.

18-139. Furnace Atmospheres for Sintering. Part II—Dissociated Ammonia and Partially Burned Fuel Gas. H. M. Webber and A. G. Hotchkiss. *Industrial Heating,* v. 14, July 1947, p. 1084, 1086, 1088, 1090, 1092, 1094, 1096.

Equipment and procedures for producing and purifying the above atmospheres. (To be continued.)

18-140. Dayton Forging and Heat Treating Co. Features Salt Bath Furnaces for Commercial Heat Treating. *Industrial Heating,* v. 14, July 1947, p. 1182, 1184, 1186, 1188.

Facilities of this company.

18-141. Forging Failure Caused by Carbon Pickup. Martin B. Graham. *Iron Age,* v. 160, July 24, 1947, p. 65-67.

Investigation of a fracture in a forged steel link which led to the conclusion that the failure was caused by carbon pickup during a heating operation with oil-fired furnaces. Points out the need for checking heating furnaces for excessive carbon deposits.

18-142. Treating Steels by Induction Heating. R. A. Whiteman. *Radio News (Engineering Dept.)*, v. 37, May 1947, p. 16-19.

Metallurgical properties of steel and their dependence on heat treatment.

18-143. Die Aufkohlung von Stahlen als Reaktion im festen Zustand. (The Carburization of Steel as a Reaction in the Solid State.) H. Stager, E. Brandenberger, and E. Kobel. *Schweizer Archiv*, v. 12, April 1947, p. 97-113.

Contradictions found in the technical literature as to whether the carburization of steels is a solid or gas-phase reaction are partially clarified by experimental work. The absorption of carbon, when a solid carburization agent is used, under certain conditions, may be assumed to be a solid-phase reaction.

18-144. Effect of Artificial Aging on Tensile Properties and Resistance to Corrosion of 24 S-T Aluminum Alloy. Hugh L. Logan, Harold Hessing, and Harold E. Francis. *Journal of Research of the National Bureau of Standards*, v. 38, May 1947, p. 465-468.

Effects of aging at various temperatures and times.

18-145. Contribution a l'Etude des Toles Extra Douces Ecrouies Traitements Thermiques. (Contribution to the Study of Extra-Mild Cold Worked Sheet Steel.) J. Yourtaieff. *Revue de Metallurgie*, May-June 1946, p. 162-168.

Relaxation treatment, low-temperature polishing, and normalizing of sheets of Martin steel.

18-146. Heat Treating Aircraft Blades Made From Steel Tubing at American Propeller Corporation. Part II. *Industrial Heating*, v. 14, July 1947, p. 1074-1078, 1080.

Concluded.

18-147. Armor Plate. *Iron and Steel*, v. 20, July 1947, p. 369-370.

Gas carburizing process as conducted in Germany.

18-148. One Salt Bath for Both Carburizing and Cyaniding. Frank Steigerwald. *Materials & Methods*, v. 26, July 1947, p. 75-77.

Through oxygen activation the same salt bath can be used for both cyaniding and carburizing. The new bath permits close control of case depth, rapid carburization, and easy cleaning of parts after quenching. Oxygen is used during carburizing but not for cyaniding.

18-149. The Ignition of Magnesium Alloys During Heat Treatment. C. B. Willmore and W. S. Peterson. *Materials & Methods*, v. 26, July 1947, p. 85-88.

A series of ignition-point tests conducted on two common magnesium alloys indicate that fire hazards result from accidental contact with materials which form low-melting alloys, slivers, burrs and sharp edges. Under certain conditions, ignition occurred below the melting point of the alloy.

18-150. Spray Quench for Tubular Assemblies. Walter H. Holcroft. *Materials & Methods*, v. 26, July 1947, p. 134.

For large and bulky parts.

18-151. Tempering Toolsteels. George A. Roberts. *Steel*, v. 121, July 28, 1947, p. 72-74, 98, 100.

Complete data on the interrelationships of hardness, tempering time, and tempering temperature of three important high speed steels in common use. (To be continued.)

18-152. Warmtebehandeling van Kettingen. (Heat Treatment of Chains.) M. G. Van Der Steeg. *Metalen*, June 1947, p. 190-192.

Compares annealing, normalizing, and hardening followed by tempering for chains during fabrication and after use, with special attention to their influence on the impact strength of the material.

18-153. Industrial Applications of High Frequencies. *Brown Boveri Review*, v. 33, Oct. 1946, p. 314-315.

Applications of Brown-Boveri equipment to the surface hardening of steel parts and other processes.

18-154. Hardenability and Strength of Casehardened Machine Steel. (Concluded.) J. E. Erb and D. M. Woolf. *Steel Processing*, v. 33, July 1947, p. 417-419.

Tests showed that light casehardening provides a hard, wear resisting surface without sacrifice of either strength or durability, on a steel containing 0.18% C, 0.40% Mn, 0.040% P, 0.050% S, and 0.25% Si.

18-155. Suspended Carburization. O. E. Cullen. *Steel Processing*, v. 33, July 1947, p. 431-436.

Recently developed process and equipment whereby a charge of steel undergoing carburization can be placed in a state of suspension for an indefinite period without harmful effect to the charge, after which carburization can be resumed at the point where it was halted.

18-156. Toolsteels. Part VII. L. Sanderson. *British Steelmaker*, v. 13, July 1947, p. 350-355.

Grinding; hardening temperatures; quenching; tempering; annealing and requenching; quenching media; and heating effects.

18-157. A Laboratory Study of Quench Cracking in Cast Alloy Steels. M. C. Udy and M. K. Barnett. *Transactions of American Society for Metals*, v. 38, 1947, p. 471-485; discussion, p. 485-487.

A laboratory test to demonstrate the effects of chemical composition and heat treatment variables upon the sensitivity of steel to quench cracking. Composition was the most potent variable studied and, of the individual elements promoting cracking, carbon was the most powerful.

18-158. Stress Cracking of Electroplated Lockwashers. K. B. Valentine. *Transactions of American Society for Metals,* v. 38, 1947, p. 488-494; discussion, p. 494-504.

Tests on electroplated lockwashers show the effects of hardness variations on stress cracking. Recommended procedures for eliminating hydrogen embrittlement by thermal aging.

18-159. Age Hardening Copper-Cobalt-Manganese Alloys. Jay W. Fredrickson. *Transactions of American Society for Metals,* v. 38, 1947, p. 593-616; discussion, p. 616-617.

Alloys containing 2 to 4% Co and up to 15% Mn have hardenable characteristics and the ability to harden from Rockwell F-67 to Rockwell B-81 from an annealed condition. The optimum treatment consists of aging at 900, 1000, and 1100° F.

18-160. Electrometallurgy in Canada. J. L. Balleny. *Electrical Engineering,* v. 66, Aug. 1947, p. 774-778.

Steel strip annealing; wire patenting; aluminum heat treatment; induction heating; regulation of melting furnaces; alloy steel melting. (From paper "Electric Furnace Practice in Canada," presented at A.I.E.E. summer general meeting, Montreal, Canada, June 9 to 13, 1947, and scheduled for publication in *A.I.E.E. Transactions,* v. 66, 1947.)

18-161. Bainitic Hardening of High Speed Steel. C. K. Baer and P. Payson. *Transactions of American Society for Metals,* v. 39, 1947, p. 488-513; discussion, p 514-520.

If partially transformed steel is heated for several hours at 1050° F., cooled to between 450 and 600° F., and held for some time, additional bainite can form. Thus, by combinations of transformation and tempering periods, it is possible to heat treat high speed steel to a structure consisting almost entirely of tempered bainite. Cutting tests show that bainitic high speed tools outperform tools of the same steels heat treated by conventional methods. 18 ref.

18-162. Changes in Size and Toughness of High-Carbon, High-Chromium Steels Due to Subzero Treatments. L. E. Gippert and G. M. Butler, Jr. *Transactions of American Society for Metals,* v. 39, 1947, p. 549-557; discussion, p. 558-568.

Three types of high-carbon, high-chromium die steels are shown to expand considerably when given a subzero treatment after hardening before tempering. Hardnesses of Rockwell C-67 to 68 are developed. Izod impact tests revealed no excessive brittleness when allowance was made for the increased hardness.

18-163. The Precipitation Heat Treatment of Workhardened 61S-W Aluminum Alloy Sheet. J. J. Warga. *Transactions of American Society for Metals,* v. 39, 1947, p. 680-689; discussion, p. 689-693.

The effects of prior workhardening upon the rate of aging of 61S aluminum-alloy sheet, and upon physical properties. It is concluded that the speed of reaction is increased measurably, but that no practical advantages are gained.

18-164. Carburized Cases of Hypoeutectoid Carbon Content. P. C. Rosenthal and G. K. Manning. *Transactions of American Society for Metals,* v. 39, 1947, p. 801-815; discussion, p. 815-819.

A method of restricting the maximum carbon content of carburized cases to the range of 0.80 to 0.40% carbon by adding silicon-bearing materials and a chloride to the carburizing compounds. The materials investigated were ferrosilicon, silicon carbide, calcium silicide, and silica, and chlorides of nickel, chromium, copper, calcium, and sodium. On the basis of weight per cent, ferrosilicon plus either nickel or chromium chloride was the most effective combination tried.

18-165. Carbide and Oxide in Surface Zones of Carburized Alloy Steels. Axel Hultgren and Erik Hagglund. *Transactions of American Society for Metals,* v. 39, 1947, p. 820-837; discussion, p. 837-842.

Results of carburizing tests for 50 hr. at 900° C. in charcoal-barium carbonate compound, in a mild carburizing compound, and in hydrocarbon gas, on a series of alloy steels. Theories regarding the formation of carbide and oxide zones in steels of certain alloy contents when carburized under certain defined conditions. 12 ref.

18-166. Influence of Water Vapor and Methane on the Heat Treatment of Steel in a CO:H_2 Gas Atmosphere. Henry M. Heyn. *Metal Progress,* v. 52, Aug. 1947, p. 232-237.

Summarizes address, "Controlled Atmospheres and their Practical Application," given at Western Metal Congress and elaborates on those portions which described the utility of a cracked gas-air mixture containing about 20% CO, 40% H_2, 40% N_2 and controlled amounts of water vapor and methane.

18-167. Classification of Prepared Atmospheres. C. C. Eeles and M. E. Shriner. *Metal Progress,* v. 52, Aug. 1947, p. 256-B.

Classes, method of preparation, analysis, air-gas ratio, dew point, cost, and nature of atmosphere. (From American Gas Assoc., Industrial and Commercial Gas Section, Information Letter No. 9.)

18-168. Tempering Toolsteels. (Concluded.) George A. Roberts. *Steel,* v. 121, Aug. 4, 1947, p. 96-98, 100.

Tempering characteristics of three cold working and two hot working, highly alloyed die steels.

18-169. An Investigation of Tempered Chromium-Silicon Spring Steel. H. J. Elmendorf. *American Society for Metals Preprint No. 1,* 1947, 18 p. (To be published in *Transactions* for 1948.)

The tension stress-strain curves for stress relieved, "blued", chromium-silicon spring wires show marked changes in shape as a function of the bluing temperature, and these changes are found to be associated with hardness of the tempered wire, and with mechanical properties of the blued spring wires. Results indicate that chromium-silicon steel is superior to S.A.E. 6150 under the conditions studied.

18-170. Tempering Effects and the Mechanical Equation of State. J. C. Fisher and C. W. MacGregor. *American Society for Metals Preprint No. 3,* 1947, 11 p. (To be published in *Transactions* for 1948.)

The concept of a mechanical equation of state is extended to include materials being tempered. A composite variable including the combined effects of temperature and time is introduced. Tension tests of the true stress-strain type are used to show the effects of tempering on true stress-strain properties. It is shown that tempering is independent of strain, indicating that, in the absence of recrystallization and similar phenomena, the stress reaction in tempered martensite depends only on instantaneous values of temperature, strain, strain rate, and tempering parameter.

18-171. The Induction Hardening of a Quality Controlled Cast Iron. C. F. Walton and H. B. Osborn, Jr. *American Society for Metals Preprint No. 4,* 1947. (To be published in *Transactions* for 1948.)

The ready response of the material studied to the short heating cycles inherent in induction heating makes it especially well suited to this type of treatment. Also upon induction hardening, this material develops unusually high wear resistance without loss of strength.

18-172. Some Factors Affecting the Induction Hardening of an Alloy Cast Iron. J. R. Sloan and R. H. Hays. *American Society for Metals Preprint No. 5,* 1947, 34 p. (To be published in *Transactions* for 1948.)

In induction hardening of gray cast-iron cylinder liners, utilizing frequencies of 3000 and 9600 cycles per sec., certain unusual results were encountered. The higher frequency resulted in increased surface temperatures, which caused some absorption of segregated alloys and resolution of graphite. This caused increased retention of austenite and decreased surface hardness; also certain low-melting constituents were melted. Conclusions are verified by micrographic methods, subzero cooling, microhardness tests, and by chemical and X-ray analyses.

18-173. A Study of the Metallurgical Characteristics of Three Induction Hardened Steels Heated at Various Rates. James W. Poynter. *American Society for Metals Preprint No. 6,* 1947. (To be published in *Transactions* for 1948.)

Specimens of S.A.E. 1045, 1.06% C drill rod, and S.A.E. 4340 steels in the pearlitic, normalized, and spheroidized conditions were induction heated at various rates to a temperature slightly above the critical, and to 1040° C. Microhardness determinations and metallographic examinations were made on the hardened zone.

18-174. The Dimensional Stability of Steel. Part II. Further Experiments on Subatmospheric Transformations. S. G. Fletcher, B. L. Averbach and M. Cohen. *American Society for Metals Preprint No. 7,* 1947. (To be published in *Transactions* for 1948.)

The transformation of retained austenite by subzero cooling was investigated in three typical toolsteels, and the stabilization of this austenite toward subzero transformation was studied as a function of austenitizing and tempering treatments. The retained austenite can be transformed by immediate refrigeration after quenching only if its amount is low. However, almost complete stabilization may be obtained by tempering prior to subcooling. Activation energies were obtained for the effect of tempering on the contraction of martensite and on the stabilization of austenite. These indicate that stabilization is not controlled by the martensite contraction.

18-175. The Heat Treatment and Properties of Some Beryllium-Nickel Alloys. W. Lee Williams. *American Society for Metals Preprint No. 11,* 1947, 13 p. (To be published in *Transactions* for 1948.)

Effects of time and temperature on

the precipitation hardness of a 2.07% beryllium-nickel alloy of commercial purity. Information gained served as a basis for the heat treatment of a cold-rolled 13/16-in. bar containing 1.62% beryllium. Specimens of this material were tested in the full-hard condition for tensile and impact properties, corrosion resistance in salt water, and fatigue strength in air, and under the simultaneous influence of cyclic stress and corrosion.

18-176. The Effect of Homogenization in Cast Steels. R. J. Marcotte and C. T. Eddy. *American Society for Metals Preprint No. 30,* 1947. (To be published in *Transactions* for 1948.)

Hardenability, impact properties, and the time-temperature transformation curves for certain selected cast steels were studied using test bars cut from keel block coupons. The effects attributable solely to homogenization are negligible.

18-177. Heat Treatment of Welded Constructions in Mild Steel. *Transactions of the Institute of Welding B.W.R.A. Supplement,* v. 10, June 1947, p. 3-5.

Recommendations prepared by the British FE.14 Committee.

18-178. Isothermal Heat Treatment of Steel Ball Bearing Races. Harold A. Knight. *Materials & Methods,* v. 26, Aug. 1947, p. 86-87.

A preliminary grinding operation is dispensed with.

18-179. Practical Aspects of Surface Hardening Methods. H. E. Boyer. *Iron Age,* v. 160, Aug. 14, 1947, p. 74-79.

The possibilities and limitations of pack carburizing, liquid carburizing, gas carburizing, and nitriding. Each method is intended for a definite role in the surface hardening of steel parts. Details of pack and liquid carburizing. (To be continued.)

18-180. Minimizing Die-Block Distortion Resulting From Hardening. *Iron Age,* v 160, Aug. 14, 1947, p. 79.

Hardening of large die blocks having an impression machined out to form a half-round and also having a hole running perpendicular to this surface. To minimize distortion, hardened 3-in. round bars are inserted in each end of the die during cooling from 1000 to 500° F.

18-181. Long Pieces Can Be Induction Hardened Progressively. *American Machinist,* v. 91, Aug. 14, 1947, p. 102-104.

Lengthy pieces are fed first through specially designed induction coils, then through a spray quench.

18-182. The Effect of Stabilizing and Stress Relief Heat Treatment on Welded 18-8 Stainless Steel. Wilson G. Hubbell. *Aircraft Engineering,* v. 19, July 1947, p 225-226, 227-228.

Tests were designed to determine the particular benefits, if any, which might be imparted by these processes to 18-8 Type 321 and Type 347 stainless steels for exhaust manifolds.

18-183. Precipitation Hardening. Part V. L. Sanderson. *Chemical Age,* v. 57, Aug. 2, 1947, p. 151-152.

Commercial application and normal process. (Concluded.)

18-184. Effect of Stabilizing and Stress Relief Heat Treatment for 18-8 Stainless. Wilson G. Hubbell. *Steel,* v. 121, Aug. 25, 1947, p. 86-88, 114, 119.

Serviceability tests on welded aircraft exhaust manifolds indicate that by heating titanium and columbium-stabilized Types 321 and 347 steels for 30 min. at 1650° F., some small beneficial results are realized—improved resistance to attack by corrosive aqueous solutions and electrolytes.

18-185. The Foundry Data Sheet September 1947; Glossary of Terms Employed in Heat Treating Operations. *Foundry,* v. 75, Sept. 1947, p. 123-124.

A set of definitions that does not include temperatures.

18-186. Practical Aspects of Surface Hardening Methods. H. E. Boyer. *Iron Age,* v. 160, Aug. 28, 1947, p. 74-78.

Possibilities and limitations of pack carburizing, liquid carburizing, gas carburizing and nitriding; the applications for which each is most suitable; the advantages and limitations of gas carburizing and nitriding. Precautions to be observed. (Concluded.)

18-187. Application of Induction Heating to Various Large Objects. V. A. Troitsnogo. *Industrial Power (U.S.S.R.),* v. 4, June 1947, p. 11-12. (In Russian.)

Heat treating four different massive metal parts, for instance large gear wheels.

18-188. Quenching Media. R. E. W. Gunn. *Journal of the Iron and Steel Institute,* v. 156, Aug. 1947, p. 524.

A simplification of the calculation described by F. W. Jones and W. I. Pumphrey (May issue).

18-189. Practical Aspects of Bainitic Hardening of High-Speed Steel. C. K. Baer and A. E. Nehrenberg. *Iron Age,* v. 160, Sept. 4, 1947, p. 65-70; Sept. 18, 1947, p. 77-82.

Improvements in performance qualities of high speed steel cutting tools were made possible by the development of a new method of heat treating. Metallurgical aspects and comparison with conventional hardening practice. Bainite formation data are based on microstructural, specific volume, length change, and hardness test methods. Laboratory and service data show improvements resulting from use of the method. Cutting efficiency of

primary and secondary bainite compared. 21 ref.

18-190. Heat Treating by Electric Salt Bath Furnace Process. *Canadian Metals & Metallurgical Industries,* v. 10, Aug. 1947, p. 21-22.

Unusual features of a modern Upton electric salt bath furnace installation.

18-191. Lämpliga Temperaturer och Tider för Etappglödgning. (Suitable Temperature and Time for Cycle Annealing.) K. O. Nordin and E. Tholander. *Jernkontorets Annaler,* v. 131, no. 7, 1947, p. 243-258.

Study of the literature on the isothermal transformation of austenite in order to coordinate data for cycle annealing. 46 ref.

18-192. Appliances Used in Heat Treatment Operations. *Machinery Lloyd (Overseas Edition),* v. 19, Aug. 16, 1947, p. 87-89.

Nichrome boxes, racks, and fixtures.

18-193. Carbo-Nitriding of S.A.E. Steel Parts. Walter H. Holcroft. *Metal Progress,* v. 52, Sept. 1947, p. 380-386.

Clean hardening of finished alloy steel parts with a light case and with minimum size change. The atmosphere used was 20% CO, 40% H_2, and 40% N_2 plus metered amounts of a hydrocarbon gas and ammonia.

18-194. Continuous Scale-Free Heat Treatment of Curtiss Electric Propeller Hubs. *Industrial Heating,* v. 14, Sept. 1947, p. 1412-1414, 1416, 1418, 1420, 1422.

Equipment and procedures. (To be continued.)

18-195. Applications of the Science of Gas Chemistry to Heat Treating Processes. O. E. Cullen. *Industrial Heating,* v. 14, Sept. 1947, p. 1450, 1452, 1454, 1456, 1458.

Condensation of a paper presented to the Industrial and Commercial Gas Section, American Gas Association, at a recent conference in Boston.

18-196. Electronic Heating Expedites Production of Milk Cans. *Industrial Heating,* v. 14, Sept. 1947, p. 1460.

Annealing the necks of the cans.

18-197. Commercial Work Handled by Plant of Fred Heinzelman & Sons Since 1917. Part II. *Industrial Heating,* v. 14, Sept. 1947, p. 1518-1520, 1522, 1524, 1526. Concluded.

18-198. The Metallographic Constituents of Steels and Cast Iron as Affecting Flame Hardening. O. M. Harrelson. *Welding Journal,* v. 26, Sept. 1947, p. 771-775.

Factors which control hardenability of ferrous metals; methods for surface flame hardening.

18-199. The Effect of Stress Relief Heat Treatment on the Technical Properties of Structural Steels and Structural Elements. Otto Graf. *Welding Journal,* v. 26, Sept. 1947, p. 517s-518s.

Results of bend tests of welded beams at the Stuttgart Technical College and elsewhere. (Translated and condensed from *Stahlbau,* v. 17, 1944, p. 65-68.)

18-200. Spray Quench Speeds Induction Hardening. Frank W. Curtis. *American Machinist,* v. 91, Sept. 25, 1947, p. 79-81.

Seven typical setups illustrate automatic cycling of heating and quenching.

18-201. Warmtebehandeling van Kettingen. (Heat Treatment of Chains.) M. G. Van der Steeg. *Metalen,* v. 1, July 1947, p. 207-209.

Experience and literature data indicate that the critical temperature should not be exceeded if the carbon content is less than 0.2%. This precaution need not be observed if the carbon content exceeds 0.2%.

18-202. Bright Annealing of Brass. *Metal Industry,* v. 71, Sept. 5, 1947, p. 206.

Methods for retaining surface finish.

18-203. Nitridovani Nastroju z Rychlorezne Oceli. (Nitriding of Tools.) Josef Daslk. *Hutnické Listy,* v. 1, Nov. 1946, p. 101-108.

Results of a study of the dependence of depth and hardness of the nitrided layer on the duration of the nitriding process and of the influence of nitriding on durability of the tool. Qualities required of the nitriding salt and personal experiences in using nitrided tools.

18-204. Nomograph for Determination of the Hardness of Steel From Heat-Treating Data. A. P. Guliaev. *Factory Laboratory (U.S.S.R.),* v. 13, July 1947, p. 888-889. (In Russian.)

The variables of time of annealing, per cent carbon, temperature of annealing, and Rockwell hardness are coordinated.

18-205. Quenching of 75S Aluminum Alloy. W. L. Fink and L. A. Willey. *Metals Technology,* v. 14, Aug. 1947, T.P. 2225, 13 p.

Investigations reveal the most critical range of temperature and the effects of quenching sheet and extrusions at different rates through that temperature range, on tensile properties and resistance to corrosion. (Presented at Chicago Meeting of A.I.M.E., Oct. 1946.)

18-206. Liquid Carburizing of Sintered Steels. George Stern and Jesse Greenberg. *Powder Metallurgy Bulletin,* v. 2, Sept. 1947, p. 85-89.

Results of a study of the nature and depth of the case obtained in liq-

uid carburizing two types of sintered steel.

18-207. Improving the Quality of Heat Treated Aluminum Alloy Parts. Davidlee Von Ludwig. *Materials & Methods,* v. 23, Sept. 1947, p. 90-94.

Two factors are commonly overlooked, even in plants which believe they are using the most modern methods, namely, proper method of loading the parts into the furnace (overloading prevents desired convection currents) and slowness in the quenching operation (recommends maximum cycle of 15 sec.).

18-208. The Foundry Data Sheet. (Concluded.) *Foundry,* v. 75, Oct. 1947, p. 203-204.

Glossary of terms employed in heat-treating operations.

18-209. Success in Steel Treating Depends on Experience and Common Sense. W. R. Bennett. *Steel,* v. 121, Oct. 6, 1947, p. 178, 180, 183, 204.

Factors to be considered by the steel treater.

18-210. Factors Involved in Heat Treating a Magnesium Alloy. A. E. Flanigan, I. I. Cornet, R. Hultgren, J. T. Lapsley, and J. E. Dorn. *Metals Technology,* v. 14, Sept. 1947, T.P. 2282, 37 p.

Research on the solution heat treatment and aging of magnesium alloy AZ92 (formerly A.S.T.M. No. 17; also known as Dowmetal C or AM260) which was done under "Restricted" Project NRC-21, in 1942-1943, and reported in detail in a final report to the O.S.R.D. on September 3, 1943, is the basis of this paper. 25 ref.

18-211. The Nature of the Phenomenon of the Hardening of Steel and the High Hardness of Martensite. S. T. Kishkin. *Engineers' Digest (American Edition),* v. 4, Sept. 1947, p. 443.

Results of some experiments on effect of alloying elements and other factors on hardness and structure. (Translated and abstracted from *Izvestya Akademii Nauk (U.S.S.R.),* no. 12, 1946, p. 1799-1808.)

18-212. Change of Physical Properties of Cold Drawn Brass During Annealing. G. I. Epifanov. *Engineers' Digest (American Edition),* v. 4, Sept. 1947, p. 444.

Results of experiments made to check up on a discrepancy in previously published work. It was found that the rate of variation in electrical resistance is particularly large within three temperature ranges: 90 to 120° C., 180 to 240° C., and 300 to 360° C. (Translated and abstracted from *Journal of Technical Physics (U.S.S.R.),* v. 16, no. 12, 1946, p. 1475-1482.)

18-213. Nuclei of Crystal Growth for Temper Carbon in Black-Heart Malleable Iron. G. Joly. *Engineers' Digest (American Edition),* v. 4, Sept. 1947, p. 445.

Results of investigation of the number of nuclei and, therefore, the time required for annealing. (Translated and abstracted from *Fonderie,* Nov. 1946, p. 375-382.)

18-214. Advancements in Industrial Heat Treating Equipment. LeRoy A. Lindberg. *Metal Progress,* v. 52, Oct. 1947, p. 586-590.

Developments of past 30 years.

18-215. Examples of Metallurgical Progress at International Harvester Co. *Metal Progress,* v. 52, Oct. 1947, p. 614-624.

Induction hardening of surfaces; continuous heat treatment of ball-bearing race rings; production of gray-iron castings; and production of short-cycle (14½-hr.) malleable iron.

18-216. Liquid Carburizing. *Iron Age,* v. 160, Oct. 9, 1947, p. 48, 50, 52.

George D. Johnston points out some parts of article by H. E. Boyer on practical aspects of surface hardening methods (Aug. 14 issue), which he believes are incorrect. Mr. Boyer's reply.

18-217. New Surface Hardener Combines Precision and Speed. *Iron Age,* v. 160, Oct. 9, 1947, p. 84.

New development, using flames for surface hardening of parts in production quantities, recently announced by the Cincinnati Milling Machine Co.

18-218. Verschijnselen bij de Veroudering van Metallische Systemen. (Phenomena in the Precipitation Hardening of Metallic Systems.) H. C. J. de Decker. *Metalen,* v. 2, Sept. 1947, p. 7-14.

A critical survey of precipitation-hardening phenomena. Changes in mechanical, electrical and magnetic properties, microstructure, and an X-ray study of aging. 15 ref.

18-219. Heat Treatment of Welds. *Coke and Gas,* v. 9, Sept. 1947, p. 271-272, 281.

Recommendations of committee of British Welding Research Assoc.

18-220. High Speed Annealing of Stainless Bars and Tubes. E. S. Kopecki. *Iron Age,* v. 160, Oct. 16, 1947, p. 143-149.

Gas-combustion techniques, based on the ability to generate heat at high rates and permitting precision control over the heat intensity and pattern, which have been developed to the extent of making possible a new economic approach to metal heating and heat treating with gas. Utilization of this technique in the annealing of stainless-steel bars and tubes at Republic Steel Corp. and Allegheny Ludlum Steel Corp., respectively, permits

mechanization of the handling of successive charges and results in heating effects being exactly timed and processing being completed at high speeds.

18-221. How to Predict Suitability and Determine Method of Martempering Hypo-Eutectoid Steel. Don Rosenblatt. *Steel,* v. 121, Oct. 20, 1947, p. 94-96, 121, 124, 126.

How technological information may be used in practical shop problems on martempering steel parts.

18-222. Rectification of Neutral Salt Baths. P. H. Kramer. *Iron Age,* v. 160, Oct. 23, 1947, p. 52-54.

A new principle of reconverting the oxides to the original chlorides, instead of forming insoluble reaction products. Advantages accruing from this method, called the neutra-gas process, are said to be cleaner work, lower salt consumption, and elimination of sludge formation.

18-223. Electric Salt Baths for Wire Processing. H. J. Babcock. *Wire and Wire Products,* v. 22, Oct. 1947, p. 751-753, 756-760.

Developments of past ten years.

18-224. Continuous Gas Carburizing of Steel Without a Gas Generator. Walter H. Holcroft and Edward C. Bayer. *Materials & Methods,* v. 26, Oct. 1947, p. 92-93.

A mixture of industrial gas and rich hydrocarbon gas makes possible continuous gas carburizing without additional equipment.

18-225. Some Trends and Fallacies in French and Belgian Metallurgical Practices. Davidlee Von Ludwig. *Industrial Gas,* v. 26, Oct. 1947, p. 7-9, 27-30.

Discussion resulting from visits to 51 industrial plants limited to controlled-atmosphere practices. Trends are toward their more widespread use and away from German and British techniques toward American ones. "Fallacies" are a frequent lack of appreciation of fundamental gas laws, as illustrated by introduction of controlled atmospheres into chambers with both ends wide open.

18-226. Continuous Carburizing and Hardening of Piston Pins at the Ford Rouge Plant. *Industrial Heating,* v. 14, Oct. 1947, p. 1580-1582, 1584, 1586, 1588, 1590, 1592, 1755-1756, 1758, 1760.

18-227. Scale (Iron Oxide). W. Trinks. *Industrial Heating,* v. 14, Oct. 1947, p. 1601-1602, 1604.

Fundamental principles of scale formation on heating of iron or steel.

18-228. Flame Hardening Locomotive Brake and Spring Rigging Pins and Bushings. B. W. Covell. *Welding Journal,* v. 26, Oct. 1947, p. 918-922.

Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.

18-229. Practical Heat Treatment. Henry Pfahl and G. D. Rahrer. *Steel Processing,* v. 33, Oct. 1947, p. 630-634.

Fundamentals of normalizing; annealing; quenching and tempering; austempering; martempering.

18-230. Soluble Oil in Flame Hardening Operations. Stephen Smith. *Iron and Steel Engineer,* v. 24, Oct. 1947, p. 59-63; discussion, p. 63.

Use of soluble oil solutions as a quench because of their ability to quench steel rapidly through the critical zone, as well as at a slower rate in the lower temperature range. (Presented at A.I.S.E. Annual Convention, Cleveland, Oct. 4, 1946.)

18-231. Salt Baths—for High Speed Steel Hardening. W. E. Bancroft. *Canadian Metals & Metallurgical Industries,* v. 10, Oct. 1947, p. 22-25, 31-32, 34.

Types; applications and limitations; time-temperature cycles; operation and maintenance; costs.

18-232. Steel Treating Without Decarburization in Controlled Atmospheres. Harry E. Lewis. *Western Machinery and Steel World,* v. 38, Oct. 1947, p. 94-99, 111.

Elementary principles; various types of atmosphere-producing equipment, from the user's point of view.

18-233. Interrupted Quenching as a Metallurgical Tool. C. H. Lekberg. *Steel,* v. 121, Oct. 27, 1947, p. 79, 107-108, 111.

Techniques and equipment used in austempering, isothermal quenching, and martempering. (From Information Letter No. 10, Industrial and Commercial Gas Section, American Gas Association, New York.)

18-234. Skin Hardening. R. J. Brown. *Automobile Engineer,* v. 37, Oct. 1947, p. 389-390.

Some aspects of the high-frequency induction process.

18-235. Bright Annealing Replaces Pickling in Porcelain Enameling Plant. A. R. Mallonn. *Iron Age,* v. 160, Nov. 6, 1947, p. 91

Condensation of paper presented at 9th Annual Porcelain Enamel Institute Forum, Columbus, Ohio.

18-236. X-Ray Investigation of Carbide Formation During the Tempering of Carbon Steel. I. V. Isaichev. *Journal of Technical Physics (U.S.S.R.),* v. 17, July 1947, p. 839-854. (In Russian.)

Carbide formation during tempering of hardened 1.04% C steel was studied using X-ray methods.

18-237. Flame-Hardening Machine Tool Parts. W. D. Whalen. *Production Engineering & Management,* v. 20, Nov. 1947, p. 75-77.

Processing of numerous parts in small quantities; volume production of a single product.

18-238. Automatic Flame Hardening. M. R. Nelson. *Machinery,* v. 54, Nov. 1947, p. 150-153.

Typical automatic flame hardening operations on gears, wheels, long and short rolls and cylinders, and flat surfaces.

18-239. Influence du Recuit de Détente sur la Structure de la Perlite et les Propriétés Mécaniques des Aciers Moulés. (Influence of the Stress-Relief Anneal on the Structure of Pearlite and the Mechanical Properties of Cast Steels.) Francis Meunier. *Revue de Métallurgie,* v. 44, Jan-Feb. 1947, p. 39-46.

Results of investigations on the mechanical properties of cast steels, corroborating the data obtained by Jolivet on the mechanism of formation of globular pearlite by annealing above the point of transformation to pearlite. American work is cited.

18-240. Some Developments in the Annealing of Malleable White Iron. Ivor Jenkins. *Metal Treatment,* v. 14, Autumn 1947, p. 175-193.

The fundamentals of the production of white malleable iron. Several processes are involved, including decarburization, diffusion, and the solution of precipitates in austenite. The development of the modern gaseous-annealing process and plant. Suggestions for research. 16 ref.

18-241. Deep Nitriding of Cutting Tools. B. I. Kostetsky and G. D. Kuruklis. *Engineers' Digest (American Edition),* v. 4, Oct. 1947, p. 489-490.

Results of a series of experiments including surface preparation and use of catalysts. Procedure adopted; results of service tests in comparison with the old process show fourfold improvement. (Translated and condensed from *Stanki i Instrument,* no. 6, 1946, p. 16-19.)

18-242. Salt Bath Annealing Proves Fast and Versatile. E. L. McReynolds. *Wire and Wire Products,* v. 22, Nov. 1947, p. 883-884, 916.

Advantages of salt bath annealing.

18-243. An Investigation of Tempered Chromium-Silicon Spring Steel. *Wire and Wire Products,* v. 22, Nov. 1947, p. 895, 918-920.

Mechanical properties of above wire (0.57% C, 0.76% Mn, 0.014% P, 0.017% S, 1.60% Si, and 0.77% Cr), as dependent on hardness level (48.5, 50, or 52.5 Rockwell C) and heat treatment procedure. (Presented at meeting of A.S.M., Chicago, Oct. 20-25, 1947.)

18-244. The Process of Suspended Carburization. *Industrial Gas,* v. 26, Nov. 1947, p. 13-15, 24-26.

Recently developed process whereby a charge of steel undergoing carburization can be placed in a state of suspension for an indefinite period without harmful effect, and at the conclusion of this period, the carburization can be resumed at the point where it was halted.

18-245. Salvage of Cast Iron Through Heat Treatment. Davidlee Von Ludwig. *Materials & Methods,* v. 26, Nov. 1947, p. 87-89.

How Sperry Gyroscope Co. applied growth tendency of cast irons to the corrective heat treatment of 700 ballistic cams worth $700 each which had been found to have defective internal structures. A special jig was used to prevent distortion, and the growth was adequate to permit regrinding of all controlled dimensions. The process has since been used on miscellaneous parts, but is especially applicable to cast iron engine cams and crankshafts.

18-246. Some Observations on the Occurrence of the "Grain Boundary Gamma" Phase in a 2% Beryllium, 0.25% Cobalt Copper Alloy. P. J. E. Forsyth. *Metallurgia,* v. 36, Oct. 1947, p. 309-312.

Specimens in the annealed and half-hard condition were subjected to various solution heat treatment and tempering treatments. Quenching tests were then made to determine the effect of the quenching rate on the amount of grain boundary precipitate. Results of microscopic examination.

18-247. The Heat Treatment of Steels Without Decarburization. R. A. P. Misra. *Metallurgia,* v. 36, Oct. 1947, p. 327-330.

A new apparatus for producing and maintaining a suitable heat treating atmosphere. The equipment described burns paraffin or kerosene. Typical results on a number of steels.

18-248. Heat Treating; a Cooperative Endeavor. Keith F. Finlay. *Western Machinery and Steel World,* v. 38, Nov. 1947, p. 84-86.

Procedures adopted for coordination between design and heat treating departments at Northrop Aircraft.

18-249. Continuous Versus Batch Annealing of Sheet and Strip. T. F. Olt. *Iron and Steel Engineer,* v. 24, Nov. 1947, p. 52-62; discussion, p. 62-64.

Factors from the quality, economic, and production standpoint that govern the particular method of annealing for various grades of sheet and strip. Even with the most modern equipment, fuel and labor costs for normalizing exceed those of box annealing. (Presented before A.I.S.E.

Pittsburgh District Section Meeting, March 10, 1947.)

18-250. Practical Heat Treatment. Henry Pfahl and G. D. Rahrer. *Western Metals,* v. 5, Nov. 1947, p. 24-28.

Normalizing; annealing; quenching and tempering; austempering; and martempering as applied to steel.

18-251. Approximate Relationship Between Case Depth and Rockwell Hardness. B. R. Payne, Jr., and L. S. Stutts. *Western Metals,* v. 5, Nov. 1947, p. 29-30.

Experimental investigation gave an accuracy of 0.002 in. in case-depth measurement, which is sufficient for most commercial applications. Material tested was steel containing 0.20% C, 0.94% Mn, 0.018% P, and 0.027% S.

18-252. New Fields for Prepared Atmospheres. W. A. Darrah. *Industrial Heating,* v. 14, Nov. 1947, p. 1832, 1834, 1836, 1838, 1840, 1842, 1939.

Condensed from paper presented at recent Conference on Industrial and Commercial Gas, of American Gas Assoc., Boston.

18-253. Facilities for Handling Variety of Parts Features Production Heat Treating at Atwood Vacuum Machine Co. Louis C. Smith. *Industrial Heating,* v. 14, Nov. 1947, p. 1844, 1846, 1848, 1850, 1852, 1862.

18-254. Lakeside Steel Improvement Co. Has Complete Heat Treating Facilities. *Industrial Heating,* v. 14, Nov. 1947, p. 1905-1906, 1908, 1910, 1912.

To be continued.

18-255. Selective Annealing of Nonferrous Metals. L. H. Seabright. *Metal Progress,* v. 52, Nov. 1947, p. 811-812.

Use of annealing curves for heat treatment when material with the specified heat treatment was not available.

18-256. Coalescing Anneals. Albert M. Portevin. *Metal Progress,* v. 52, Nov. 1947, p. 829-830.

The physical principles underlying spheroidization of medium and high-carbon steels. Recommends use of an "oscillating anneal" in which temperatures fluctuate about the Ac_1 point.

18-257. Creep in Hot Valve Springs. Alberto Oreffice. *Metal Progress,* v. 52, Nov 1947, p. 832.

A few additional data which show value of austempering 0.48% C, 1.20% Cr, 0.15% V steel for this use.

18-258. Advantages and Applications of Carbon Restoration. O. E. Cullen. *Steel,* v. 121, Nov. 17, 1947, p. 94-95, 121-122.

By setting up an exact carbon balance between furnace atmosphere and original carbon in the steel, the gaseous process described removes undesirable inverse gradient of carbon. Treatment may be applied at almost any stage during conversion of original billet into finished product.

18-259. Controlled Vacuum Heat Treating. *Steel,* v. 121, Nov. 24, 1947, p. 80-83, 96, 99-100, 107.

Results of research on steel, while positive in nature, do not apparently lead to any new commercial processes. Small quantities of absorbed gases do have deleterious effects upon properties of metal, but such effects are rather small.

18-260. Isothermal Heat Treatment Aids Bearing Production. Paul A. Cushman. *Iron Age,* v. 160, Nov. 27, 1947, p. 76-77.

Utilization of isothermal salt bath heat treating has resulted in decreased processing time, less distortion and brittleness, and increased uniformity of hardness. Equipment and materials used and heat treating cycles followed.

18-261. The Pins Had Slotted Ends. *Welding Engineer,* v. 32, Dec. 1947, p. 41.

Surface hardening of caster pins for heavy-duty tractors proved to be difficult because of shrinkage of the slots. The problem was solved by pressing mandrels into the ends of the pins to expand their openings to compensate for the inevitable shrinkage, and by use of the progressive-spinning method of flame hardening.

18-262. A Study of the Metallurgical Characteristics of Three Induction Hardened Steels Heated at Various Rates. James W. Poynter. *Technical Data Digest,* v. 12, Dec. 1, 1947, p. 13-22.

See item 18-173

18-263. How Low Temperature Treatments Affect Properties of Steel. H. W. Gillett. *Product Engineering,* v. 18, Dec. 1947, p. 81-84

Use of cold treatment to accelerate or to cause continuation of metallurgical reactions; the various phenomena which take place explained in terms of the phase transitions which occur. Low-temperature notched-bar strengths at various temperatures down to −80° F. are charted for a quenched and tempered, rolled, Mn-Mo steel. A further use of cooling is to permit tests at the lowest service temperatures to be encountered. Such tests and their uses.

18-264. Annealing for Stress Relief. N. F. Ritchey and P. A. Berghorn. *Die Castings,* v. 5, Dec. 1947, p. 28, 43-45.

Effects of annealing of aluminum die castings upon dimensional stability and machinability.

18-265. City Gas Atmosphere Used to Bright Anneal Copper Tubing. Arthur Q. Smith. *Industrial Gas,* v. 26, Dec 1947, p. 8-9.

18-266. Automatic Handling for Induction Hardening. G. P. Cardwell. *American Machinist,* v. 91, Dec. 18, 1947, p. 91.

How induction hardening apparatus combined with automatic handling equipment reduces production costs.

18-267. Flame Hardening of Armor Plate. E. L. Bartholomew, Jr., M. S. Burton, and F. R. Evans. *Metal Progress,* v 52, Dec. 1947, p. 979-983.

Flame hardening of low-alloy armor plate by successive passes of a torch 6 in. wide was found to produce a hardened case, uniformly 0.25 to 0.30 in. deep. Surface hardness on 0.24 to 0.31% carbon plates was 510 Vickers. However, there was always a soft line where successive passes of the heating torch overlapped. A further difficulty in thin plate was excessive warpage. Subsequent straightening was likely to crack the plate. Methods utilized to remedy these drawbacks.

18-268. Protective Coatings. Robert B. Grossman. *Industrial Gas,* v. 26, Dec. 1947, p. 12.

An evaluation of seven commercial coating materials used to prevent oxidation or decarburization of steel surfaces during heat treatment. (From "Information Letter" prepared by Committee on Heat Treating and Finishing With Gas of the Industrial and Commercial Gas Section of the American Gas Assoc.)

18-269. Continuous Scale-Free Heat Treatment of Curtiss Electric Propeller Hubs. Part II. *Industrial Heating,* v. 14, Dec. 1947, p. 1982, 1984, 1986, 1988, 1990.

The accessory equipment for heat treating, including the oil-quenching equipment, washing machine, circulating fans, atmosphere generator, and conveyer. The tempering furnace and details of furnace construction. (Concluded.)

18-270. Immersion Heating. Part II. Maurice J. Dewey. *Industrial Heating,* v. 14, Dec. 1947, p. 1992, 1994, 1996, 1998, 2000, 2006.

The categories to which the principle of immersion heating can be applied: water heating, oil heating, soft-metal melting, salt baths, acid heating, and controlled quenching. (To be continued.)

18-271. Lakeside Steel Improvement Co. Has Complete Heat Treating Facilities. Part II. *Industrial Heating,* v. 14, Dec. 1947, p. 2067-2068, 2070, 2072, 2074, 2076.

The continuous furnace, induction-hardening equipment, flame hardening equipment, annealing, stress-relieving and tempering furnaces, and auxiliary equipment for straightening, inspection, and control. (Concluded.)

18-272. Use of Modified Martempering for Hardening Intricately Shaped Dies. Wilhelm Olson and Gerald Nevins. *Steel,* v. 121, Dec. 15, 1947, p. 88-89, 115.

Salt martempering practically eliminated distortion and produced satisfactory hardness in Mn-Cr-W oil hardening steel, but a noticeable amount of growth occurred. In large dies, considerable trouble was experienced in maintaining proper clearance for dowel-pin holes. Introduction of martempering oil made possible a quench or an equalization temperature intermediate between that of salt and conventional quenching.

18-273. Operations in the Production of Helicopters at the Bell Aircraft Plant. Edward L. Kramer. *Machinery,* v. 54, Dec. 1947, p. 164-168.

Nitriding of gears to a case depth of 0.022 in. and bonding of stainless steel to birch-veneer strips by "cycle welding" are two of the operations.

18-274. Development of Temper Brittleness in Alloy Steels. W. S. Pellini and B. R. Queneau. *Transactions of American Society for Metals,* v. 39, 1947, p. 139-153; discussion, p. 153-161.

Previously annotated in R.M.L., v. 3, 1946, item 18-238.

18-275. The Tempering of High-Alloy Toolsteels. George A. Roberts, Arthur H. Grobe, and Christian F. Moersch, Jr. *Transactions of American Society for Metals,* v. 39, 1947, p. 521-546; discussion, p. 546-548.

Previously annotated in R.M.L., v. 3, 1946, item 18-235.

18-276. The Interrupted Quench and Its Practical Aspects. Howard E. Boyer. *Transactions of American Society for Metals,* v. 38, 1947, p. 209-225; discussion, p. 225-238.

Previously annotated in R.M.L., v. 3, 1946, item 18-239.

18-277. Relation of Quenching Rate and Hardenability to the Mechanical Properties of Several Heat Treated Cast Alloy Steels. Charles R. Wilks, Howard S. Avery, and Earnshaw Cook. *Transactions of American Society for Metals,* v. 38, 1947, p. 437-468; discussion, p. 468-470.

Previously annotated in R.M.L., v. 3, 1946, item 18-240.

18-278. Carbon Concentration Control. E. G. DeCoriolis, O. E. Cullen, and Jack Huebler. *Transactions of American Society for Metals,* v. 38, 1947, p. 659-681; discussion, p. 681-685.

Previously annotated in R.M.L., v. 3, 1946, item 18-237.

18-279. The Heat Treatment and Properties of Some Beryllium-Nickel Alloys. W. Lee Williams. *Transactions of Amer-*

ican Society for Metals, v. 40, 1948, p. 163-175; discussion, p. 175-179.
See item 18-175.

18-280. An Investigation of Tempered Chromium-Silicon Spring Steel. H. J. Elmendorf. *Transactions of American Society for Metals,* v. 40, 1948, p. 281-298; discussion, p. 298-301.
See item 18-169.

18-281. Tempering Effects and the Mechanical Equation of State. J. C. Fisher and C. W. MacGregor. *Transactions of American Society for Metals,* v. 40, 1948, p. 302-312; discussion, p. 312-314.
See item 18-170.

18-282. The Effect of Homogenization on Cast Steels. R. J. Marcotte and C. T. Eddy. *Transactions of American Society for Metals,* v. 40, 1948, p. 649-674; discussion, p. 674-676.
See item 18-176.

18-283. The Dimensional Stability of Steel. Part II. Further Experiments on Subatmospheric Transformations. S. G. Fletcher, B. L. Averbach, and M. Cohen. *Transactions of American Society for Metals,* v. 40, 1948, p. 703-720; discussion, p. 720-727.
See item 18-174.

18-284. Induction Hardening of a Quality Controlled Iron. C. F. Walton and H. B. Osborn, Jr. *Transactions of American Society for Metals,* v. 40, 1948, p. 1012-1026; discussion, p. 1026-1035.
See item 18-171.

18-285. Some Factors Affecting the Induction Hardening of an Alloy Cast Iron. J. R. Sloan and R. H. Hays. *Transactions of American Society for Metals,* v. 40, 1948, p. 1036-1069; discussion, p. 1069-1076.
See item 18-172.

18-286. A Study of the Metallurgical Characteristics of Three Induction Hardened Steels Heated at Various Rates. James W. Poynter. *Transactions of American Society for Metals,* v. 40, 1948, p. 1077-1093; discussion, p. 1093-1098.
See item 18-173.

18-287. Heat Treatment of Magnesium Alloys. D. Burks, R. F. Thomson, and W. E. Jominy. *Tranactions of the American Foundrymen's Association,* v. 53, 1946, p. 253-257.
Previously annotated in R.M.L., v. 2, 1945.

18-288. Heat Treatment Study of Pearlitic Malleable Cast Iron. R. W. Lindsay and J. E. Atherton, Jr. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 301-306.
Previously annotated in R.M.L., v. 2, 1945.

18-289. Effect of Initial Heating Temperature on the Mechanical Properties of an Air-Hardened Ni-Cr-Mo Steel. J. A. Wheeler and V. Kondic. *Symposium on Metallurgy of Steel Welding, British Welding Research Assoc.,* 1947, p. 71-83; discussion, p. 84-87.
Covers temperatures from 850 to 1475° C., thus including almost the whole range of heat treatment temperatures characteristic of the hardened zone of welds. The properties investigated were: ultimate tensile strength, percentage elongation and reduction of area, and Vickers hardness; grain-size determinations.

18-290. Notes on the Process of Gaseous Malleableizing With Especial Reference to the Use of Steam. D. M. Dovey. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. A122-A128.
Previously annotated in R.M.L., v. 3, 1946.

18-291. Annealing Rate in Gaseous Malleableizing. D. M. Dovey and I. Jenkins. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. A115-A121; discussion, p. A127-A128.
Previously annotated in R.M.L., v. 3, 1946.

18-292. Heat Treatment of Gray Cast Iron for Relief of Internal Stresses. P. A. Russell. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. A185-A190; discussion, p. A190-A191.
Previously annotated in R.M.L., v. 3, 1946.

SECTION XIX

WORKING

Rolling; Drawing; Forging; Forming

19-1. Stretch Principle Employed in the Manufacturing of Seamless Tube. *Blast Furnace and Steel Plant*, v. 34, Dec. 1946, p. 1531-1532.

Application of this principle not only permits substantial reduction of wall thickness of the tube but also provides a means for making exceptionally large diameter reductions with relatively few roll passes.

19-2. Thread Rolling—Theory and Practice. Part II. J. W. Batchelder. *Iron Age*, v. 158, Dec. 26, 1946, p. 55-61.

Various stresses imposed on thread rolling dies analyzed; how they may be minimized or counteracted. Comparative testing for quantitative die life; points to be observed in the selection of materials for the manufacture of die sets. Merits of grinding to produce die threads; strength of die materials; use of carbide dies.

19-3. Predetermination of Pulling Force in Drawing Steel. W. Lueg and A. Pomp. *Materials & Methods*, v. 24, Dec. 1946, p. 1536.

Series of tests was made with carbon-chromium, 18-8 and chromium-vanadium steels in order to find a simple method to predetermine the pulling force; the drawing die had an opening of 17 mm. and an entry angle of 20°. Tests permitted the establishment of the required pulling force equation. (Condensed from *Mitteilungen aus dem Kaiser-Wilhelm Institut fur Eisenforschung zu Dusseldorf*, v. 27, 1944, p. 43-52.)

19-4. John Summers & Sons Expansion Program. *British Steelmaker*, v. 12, Dec. 1946, p. 590-595.

New developments in British sheet steel mill, including a new 80-in. reversing strip mill.

19-5. Variable Voltage Drives for Blooming Mill Tables and Feed Rolls. Z. W. Whitehouse and A. F. Kenyon. *Steel*, v. 119, Dec. 30, 1946, p. 92-94, 96.

Separate generators have "shovel" characteristics which provide a high running speed for tables and feed rolls and afford protection against overloading. Provision is made for necessary repairs and maintenance.

19-6. The Rolling of Metals: Theory and Experiment. Part XIII. L. R. Underwood. *Sheet Metal Industries*, v. 23, Dec. 1946, p. 2319-2328, 2336.

Torque, deformation work and rolling horsepower. (To be continued.)

19-7. Practical Problems of Light Presswork Production. Deep Drawing. (Continued.) J. A. Grainger. *Sheet Metal Industries*, v. 23, Dec. 1946, p. 2341-2349.

Workhardening and strain hardening; formation of stress cracks during or after cold working; use of normalizing to avoid this trouble. Possible causes of "stretcher-strain" markings; proper techniques for press-tool setting. Details of the pressing equipment including hydraulic and pneumatic cushions and systems, charging the system with oil, and the operating cycle. (To be continued.)

19-8. Some Drawing Operations on Sheet Metal. H. W. Swift. *Sheet Metal Industries*, v. 23, Dec. 1946, p. 2365-2376, 2384.

Superficial account of a few typical press operations in order to show something of the methods adopted by industry and the resources and ingenuity of the press engineer. Investigations at University of Sheffield.

19-9. New Technique in Drawing and Embossing Sheet Metal. P. D. Aird. *Modern Industrial Press*, v. 8. Dec. 1946, p. 13-14, 16.

Stampings are set with a fluid punch which exerts a steady, uniform pressure on every part of the blank. This makes possible the formation of involved contours and exceptional draws. Two methods: stretch forming and drawing.

19-10. Modern Press Line Enables Utility Appliance Corp. to Establish Enviable Production Record. Clyde Crossman. *Modern Industrial Press,* v. 8, Dec. 1946, p. 24, 26.

Sequence of operations required to make shroud rings from 12-gage heat resistant steel sheet.

19-11. "Can You Draw Aluminum?" Part II. E. V. Sharpnack. *Modern Industrial Press,* v. 8, Dec. 1946, p. 30, 32, 34, 40.

Some of the more unfamiliar "know-how" factors, including the type of steel and recommended dimensions for the tools, and proper lubrication.

19-12. Specialized Pipe Bending. M. G. Hawkins. *Modern Industrial Press,* v. 8, Dec. 1946, p. 38, 40.

Special bends of pipe are made by various hand, semimanual and electrically powered methods at Olympic Pipe Fabricating Co.

19-13. Light Alloy Extrusion. *Metal Industry,* v. 69, Dec. 13, 1946, p. 485-487.

Production of sections for the aluminum house. Production planning, pyrometry, laboratory setup, die design and assembly, billet preheating. (To be concluded.)

19-14. New 56-In. Continuous Hot Strip Mill, The Steel Company of Canada, Ltd. C. J. Porter. *Iron and Steel Engineer,* v. 23, Dec. 1946, p. 55-60.

New continuous hot strip mill and its auxiliary equipment.

19-15. Trends in Electrical Equipment for Steel Mills. G. E. Stoltz. *Iron and Steel Engineer,* v. 23, Dec. 1946, p. 61-66; discussion, p. 66-69.

Some of the developments in electrifying the steel industry since 1900 and possible future progress.

19-16. Cold Finished Bar Steel. Thomas D. Taylor. *Iron and Steel Engineer,* v. 23, Dec. 1946, p. 70-73.

Development of new types of steel for cold finished bars, and new methods to process these materials.

19-17. Roll Design for Die Rolling. Thomas N. Sloan. *Iron and Steel Engineer,* v. 23, Dec. 1946, p. 87-90; discussion, p. 91-92.

Rules for design of the rolls, and techniques used by Republic Steel for production of parts as complicated as crankshafts by die rolling.

19-18. A Tooling Program for Forged Globe Valves. Part II. Carl F. Benner. *Tool & Die Journal,* v. 12, Dec. 1946, p. 92-97.

Forging dies; the forging operation; trimming dies. (To be continued.)

19-19. Aluminum Shingles Produced on Tilted Presses. *American Machinist,* v. 91, Jan. 2, 1947, p. 95.

Standard presses, bolted to angle-iron supports anchored to the floor, are tilted to provide gravity unloading for flanging, crimping and trimming operations on the shingles.

19-20. Rolling of Screw Threads. H. Dinner and W. Felix. *Fasteners,* v. 3, no. 5, 1946, p. 10-11.

Results of tests made to establish the characteristics of rolled threads under static as well as dynamic stress. Microstructures of machined and of rolled threads are shown. It was found that static tensile and bending strengths of rolled and of machined threads are practically identical. But in the case of dynamic loading a rolled thread has greater fatigue strength and is not subject to aging. (From *Technische Rundschau Sulzer,* no. 1, 1945, p. 131-134.)

19-21. Ingot Factors in the Production of Heavy-Walled Seamless Tubes. K. L. Fetters. *Industrial Heating,* v. 13, Dec. 1946, p. 1996-1998.

Problems involved in the manufacture of heavy-walled seamless tubes were the high rate of rejection for bore defects (internal ruptures) appearing in the machined bores, and cracking in water quenching.

19-22. The Modern Forging Operation. J. A. Over. *Steel Processing,* v. 32, Dec. 1946, p. 795-796, 805-806.

Basic considerations of hammer forging of steel.

19-23. Shell Forging Press. *Iron and Steel,* v. 19, Dec. 1946, p. 809-811.

German use of new "Eumuco" design, a vertical type of press with self-contained motor drive arranged for combined piercing and drawing operations.

19-24. German Shell Steel. *Iron and Steel,* v. 19, Dec. 1946, p. 811-812.

Casting and forging procedures in general use.

19-25. Light Alloy Extrusion. (Concluded.) *Metal Industry,* v. 69, Dec. 20, 1946, p. 509-511.

Production of sections for the aluminum house.

19-26. The Production of Aluminum Hollow Ware. *Machinery (London),* v. 69, Dec. 5, 1946, p. 715-720.

Drop stamping methods at the works of Faulkners, Ltd.

19-27. Dies for Drop Stamps. *Foundry Trade Journal,* v. 80, Dec. 5, 1946, p. 345-346.

Process for making dies from the drop stamp entailing: construction of a master form in wood or plaster; casting from the master form a pattern in plaster of the lower or female die; making a sand mold from the plaster pattern and pouring zinc alloy into the mold to form the lower die; and using the lower die as a mold to

produce the top die or punch, by pouring antimonial lead into the zinc mold. (Extracted from a bulletin published by the Aluminium Development Association, "The Formation of Aluminum and Its Alloys by the Drop Stamp.")

19-28. Thread Rolling—Theory and Practice. Part III. J. W. Batchelder. *Iron Age,* v. 159, Jan. 9, 1947, p. 52-57.

Methods of finishing thread-rolling dies by grinding, lapping, and abrasive blasting. Information is also presented on testing various types of steel, setting up the dies, and inspecting dies and threads by means of an optical comparator.

19-29. Influence of Shot-Peening on Fatigue Strength of 14S-T Alloy. C. B. Gleason. *Iron Age,* v. 159, Jan. 9, 1947, p. 62-64.

Results of an investigation to determine the effect of shot-peening on the fatigue strength of 14S-T aluminum alloy. Tests on unnotched specimens indicated possibility of increases in life of as much as 80 times that of unpeened material, while notched specimens showed more than 32% improvement in fatigue strength.

19-30. An Electronic Aid in Die Making. *Tool & Die Journal,* v. 12, Jan. 1947, p. 77-80.

Contour following signal device and an electroconductive coating, termed "Signa-Kote", that is applied to the nonconducting surface of a master mold or pattern used in combination on those types of duplicating jobs where heretofore the old stand-by tin foil method was common practice. Tin foil technique and its shortcomings.

19-31. Small Precision Cold Strip Mill. *Iron Age,* v. 159, Jan. 16, 1947, p. 49-50.

Small self-contained Sendzimir precision cold strip mills capable of gage accuracies up to 0.0001 in. are said to be especially suitable for rolling thin strip down to foil gages in highly work hardening alloys.

19-32. Cold Strip Reduced in One Pass at 400 Feet Per Minute. *Steel,* v. 120, Jan. 20, 1947, p. 80.

Cold strip 0.10 to 0.125 in. thick by 36 in. wide is reduced in one pass by a cold reduction mill. Capacity is nearly 60 tons of tinplate per hr.

19-33. Tube Production by Stretch Method. *Production Engineering & Management,* v. 19, Jan. 1947, p. 59.

Process as it will be applied in world's first continuous seamless tube mill at National Tube Co.

19-34. Roll Bending and Flash Welding Stainless Steel Turbosupercharger Rings. P. B. Scharf. *Iron Age,* v. 159, Jan. 23, 1947, p. 52-56.

Process consists of roll bending or forming plate or bar into a circle of the diameter and curvature desired in the finished ring. The formed sections are then butt-flash welded together to form a continuous ring. The welding operation is followed by one or more sizing or stretching operations which insure diameter, roundness and flatness. Accuracy within close tolerance is assured. Octagonal shapes or nonuniformly shaped sections may be made by same general process.

19-35. Etude sur la Forgeabilité des Alliages Ultra-Légers. (Study of the Forgeability of Extra-Light Alloys.) Paul Bastien. *Métaux Corrosion-Usure,* v. 20, Dec. 1945, p. 155-162.

Magnesium alloys are easily forgeable at temperatures between 250 and 450° C. They are ductile when copper content is not above 15% and aluminum above 9%, and forgeable up to the same copper content. However, aluminum content must then be below 6 to 9%.

19-36. Tungsten Carbide Draw Dies. Richard Saxton. *Metallurgia,* v. 35, Dec. 1946, p. 68-69.

Production of tungsten carbide dies and their design and application in the drawing of metals.

19-37. Steel Mill Production Scheduling. D. I. Brown. *Iron Age,* v. 159, Jan. 30, 1947, p. 60-61.

Efficient scheduling of products and specifications. Takes as an example the scheduling of material on a single bar mill and shows the movement of a backlog of various products, to various specifications and for various customers, from the heat schedule right through to the shipping room.

19-38. Cold Heading Makes Pull Rods Faster. Rupert Le Grand. *American Machinist,* v. 91, Jan. 30, 1947, p. 86-87.

Pull rods, formerly turned on screw machines, are now formed by progressive heading at the rate of 0.2 hr. per 1000 pieces, or 21 times as fast. Further advantage is that the material, S.A.E. 1017 steel, is workhardened at one end by extrusion; thus the difficulty of broaching a normally draggy steel is overcome. Sequence of heading operations.

19-39. Effect of Brake Forming in Various Tempers on the Strength of Alclad 75S-T Aluminum Alloy Sheet. Walter Woods and George J. Heimerl. *National Advisory Committee for Aeronautics Technical Note No. 1162,* Jan. 1947, 4 p.

Effects are summarized, tabulated and charted.

19-40. The Art of Rolling Rounds. Charles P. Hammond. *Iron and Steel Engineer,* v. 24, Jan. 1947, p. 53-64; discussion, p. 64.

The different methods of producing rounds, including details as to practice and equipment used; many diagrams.

19-41. Electrical Control for the New 56-In. Continuous Hot Strip Mill, The Steel Company of Canada, Ltd. D. C. McCrady and W. J. Shortall. *Iron and Steel Engineer,* v. 24, Jan. 1947, p. 110-116.

Some applications of rotating regulators in the control of a modern strip mill.

19-42. Hot Spinning Operations on Heavy Metal Heads. Charles H. Wick. *Machinery (London),* v. 70, Jan. 2, 1947, p 3-8.

Modern methods of spinning steel plates, as well as other ferrou. and nonferrous metals, into the many types of heads required for various applications.

19-43. Extracting Blanks Automatically. P. D. Aird. *Modern Industrial Press,* v. 9, Jan. 1947, p. 13-14.

Basic principles of the extractor embody the utilization of the vacuum pads of press feeders and a mechanical rack or cradle which performs an operation similar to that of the unloader member of the press crew, only both operations are automatic.

19-44. Forging Die Design. John Mueller. *Steel Processing,* v. 33, Jan. 1947, p. 22-25.

Press forging.

19-45. German Practice in Cold Shaping of Steel. *Steel Processing,* v. 33, Jan. 1947, p. 33-35.

Abstract of report based on investigation made in Germany describing German practice in making bonderized cold steel flow under tremendous pressure to produce extruded steel parts and shapes.

19-46. Automatic Handling of Sheet Metal Stampings. Kenneth Rose. *Materials & Methods,* v. 25, Jan. 1947, p. 131.

Device eliminates manual handling. Ejects large sheets from blanking press automatically. Steel is fed through the side of the press, the strip is blanked and the blank is removed from the press and moved into straightening rolls without any manual handling whatever.

19-47. Hot Rolling Iron-Carbon Alloys. Part I. E. Piwowarsky and A. Wittmoser. *Iron Age,* v. 159, Feb. 6, 1947, p. 52-57.

Investigations conducted in Germany to establish the effect of various factors on the hot rolling of high-test iron in an effort to determine the feasibility of producing piston rings from rolled cast iron. Influence of chemical composition, initial structure, thermal condition and rate of reduction. Literature on subject. (To be continued.)

19-48. The Rolling of Metals: Theory and Experiment. Part XIII. (Continued.) L. R. Underwood. *Sheet Metal Industries,* v. 24, Jan. 1947, p. 73-84, 90.

Torque, deformation work and rolling horsepower. 51 ref.

19-49. Practical Problems of Light Presswork Production. (Continued.) J. A. Grainger. *Sheet Metal Industries,* v. 24, Jan. 1947, p. 95-99.

Mechanical breakdowns; advantages and disadvantages of pneumatic cushions; control of the air in pneumatic cushions; essential features of the circuit; pressure setting and tools; an assembly precaution. (To be continued.)

19-50. The Use of Rubber Buffers for Press Cushioning. *Sheet Metal Industries,* v. 24, Jan. 1947, p. 101-102.

Takes issue with certain parts of article by J. A. Grainger in September 1946 issue, and author's reply.

19-51. Metal Bellows. *Metal Industry,* v 70, Jan. 24, 1947, p. 69-70.

Production from deep drawn tubes. Advantages of the process employed.

19-52. Influence of the Speed of Deformation Upon the Resistance of Metals to Plastic Deformation. L. D. Sokolov. *Engineers' Digest (American Edition),* v 4, Jan. 1947, p. 22-24.

Lead, copper, and five alloy steels were investigated. Results tabulated, charted, and summarized. (Condensed from *Journal of Technical Physics* (U.S.S.R.), v. 16, 1946, p. 437-441.)

19-53. The Prevention of Fatigue Failures in Metal Parts by Shot-Peening. J. G. Brookman and L. Kiddle. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 23,* Dec. 1946, 14 p.

Theoretical basis governing the use of shot-peening is presented, particular reference being paid to Almen's work, and the problems of distortion, complimentary stresses, and stress concentrations. Factors necessary in a specification for peening include the selection of areas, coverage, shot type, shot size and intensity. New method for measuring intensity. Practical applications of the treatment and the possibility of obtaining large increases in life.

19-54. Hot Rolling Iron-Carbon Alloys. Part II. E. Piwowarsky and A. Wittmoser. *Iron Age,* v. 159, Feb. 13, 1947, p. 63-65.

Adverse effect of graphite in high-carbon gray iron on the mechanical properties of hot rolled iron. Roll design and the feasibility of employing rolled cast iron for piston rings.

19-55. Ball-Pen Tubular Parts Rotary-Sliced to Length. John W. Dean, Jr. *American Machinist,* v. 91, Feb. 13, 1947, p. 108-110.

How burrs and distortion are defeated by rotary knives that quickly cut gold, gold-filled and steel tubing for pen and pencil bodies and caps.

19-56. The Versatile Press Brake. John E Hyler. *Tool Engineer*, v. 18, Feb. 1947, p 44-46.

Present and potential applications of the press brake in bending, straightening, forming, multiple punching.

19-57. The Welded Steel Press. Albert Clements. *Steel*, v. 120, Feb. 17, 1947, p. 90-91, 112.

Rigidity and lateral stiffness inherent in welded construction meets all requirements. Box-type columns of generous width hold crown and bed in line even under excessively eccentric loading.

19-58. Threads Made by Stamping Process. *Product Engineering*, v. 18, Feb. 1947, p. 97.

Method effective where close accuracy is not required. Effects 50% saving. Technique illustrated.

19-59. Production Processes, Their Influence on Design. Part XX. Impact Extrusion. Roger W. Bolz. *Machine Design*, v. 19, Feb. 1947, p. 115-119.

Advantages of the process; pressures required; Hooker process; design of parts; punch strength; materials; tolerances. (Reprints of the first 15 parts of this series are now obtainable from *Machine Design's* Book Dept.)

19-60. New Gravity Drop Hammer Features Pneumatic Ram Lift. *Iron Age*, v. 159, Feb. 20, 1947, p. 47.

New tool which promises to expand the usefulness of the gravity drop hammer, cut down forging time and reduce the time required for adjustment and repair.

19-61. A Brief Summary of the Report Made to the Combined Intelligence Objectives Sub-Committee Regarding the Westfalische Drahtindustrie, Hamm, Germany, *Wire and Wire Products*, v. 22, Feb. 1947, p. 139-140.

Report gives information regarding the extent of plant for manufacture of miscellaneous wire products and its condition at the time the inspection was made; the equipment, practices, research, records, and the character of the products.

19-62. Effect of Spacing Between Dies in the Tandem Drawing of Tubular Parts. George Sachs and George Espey. *Transactions of the American Society of Mechanical Engineers*, v. 69, Feb. 1947, p. 139-143.

The importance of a sufficiently large spacing when drawing tubular parts with a tandem-die arrangement.

19-63. Improved Production of Seamless Conical Tubes. *Machinery (London)*, v 70, Jan. 23, 1947, p. 119-120.

Instead of consistently expanding the tube by direct full-length passes of the internal mandrel and outer roll disks mounted on a suitable carriage, this work is only carried out so far as to provide a tube with sectional reductions, that is, with shoulders. The shouldered tube is then pulled through a pair of specially constructed rollers, having a conical pass groove, whereby at a single draw it is converted to the finished conical tube.

19-64. Cylinder Liner Production. *Machinery (London)*, v. 70, Jan. 23, 1947, p. 99-105; Feb. 6, 1947, p. 171-173.

Methods employed at Ford Motor Co. for drawing, trimming, and flanging of engine cylinder liners made from sheet steel blanks. Heat treatment, burnishing, and finish honing operations.

19-65. Presses Set Pace for Fuel Tank Production Line. P. D. Aird. *Modern Industrial Press*, v. 9, Feb. 1947, p. 13-14, 26.

Manufacturing methods followed in the production of the Ford passenger car fuel tank.

19-66. The Manufacture of Food Machinery—Becoming a Major Industry. Thomas A. Dickinson. *Modern Industrial Press*, v. 9, Feb. 1947, p. 22, 24, 26.

Equipment and procedures at Food Machinery Corp.

19-67. Engineering Research Pays Off in the Manufacture of Steel Stall Shower Cabinets at Tiletone Co., Chicago. *Modern Industrial Press*, v. 9, Feb. 1947, p. 40, 44, 46.

Some of the operations involved in their production demonstrating development of "oil can" action and trim die for press.

19-68. Effect of Forging on Segregation in High Speed Steel. E. S. Kopecki. *Iron Age*, v. 159, Feb. 27, 1947, p. 42-43.

Effect of forge reduction on carbide distribution in high speed steel showing metallurgical structure correlated with X-ray examination at various degrees of reduction. Experimental work indicates that a minimum of approximately 90% in reduction of ingot bar is necessary in order to obtain satisfactory carbide distribution.

19-69. Metal Stamping Operations, Drawing Round Shells Without Flange. D. A. Rogers. *Machine and Tool Blue Book*, v. 43, Feb. 1947, p. 257-266; *Modern Industrial Press*, v. 9, Feb. 1947, p. 28, 32. 38.

The factors which govern the possible height of single-operation drawing of a shell. Charts and tables.

19-70. Production of Extremely Accurate Embossing Dies. Carl O. Malmstrom. *Machine and Tool Blue Book*, v. 43, Feb. 1947, p. 276-277.

Advantages to be gained from using the pantograph and metal spraying method of making embossing dies. Equipment needed. Cost and time advantages.

19-71. Dimpling and Riveting. *Aircraft Production,* v. 9, Feb. 1947, p. 67.

Tool which consists of a set of ganged pistons mounted on a common piston rod which transmits load to a head- or dimple-forming plunger. This is carried in one of a pair of fixed pincer-shaped jaws which are attached to the cylinder barrel by a pivoted adapter.

19-72. Thread-Rolled Cooling Fins. *Aircraft Production,* v. 9, Feb. 1947, p. 76.

German process for producing radiator elements from seamless tube. (Abstract of F.I.A.T. Report No. 582, H. M. Stationery Office.)

19-73. Constant-Tension Reel Drives. E. S Murrah. *Blast Furnace and Steel Plant,* v. 35, Feb. 1947, p. 205-214.

Electrical circuits and mechanical features of the systems used to maintain uniform tension in sheet steel during processing, rolling or rewinding.

19-74. Hot Rolling of Iron-Carbon Alloys With Over 1.7% Carbon. E. Piwowarsky and A. Wittmoser. *Foundry Trade Journal,* v. 81, Feb. 6, 1947, p. 125-132.

Systematic experiments carried out on the various factors entering into the hot rolling of high-test cast irons. The best initial structure for cast iron of rolling quality is a ledeburitic matrix, preferably without inclusions of free carbon. Gray and mixed irons did not respond to rolling, especially in grooved rolls. Presence of graphite carbon has practically no effect on the rolling qualities of the cast irons investigated. How the mechanical properties are improved by the conditions of rolling; the relationship between mechanical properties and degree of of deformation. Maximum increase in mechanical values is obtained with a deformation of between 60 and 80%.

19-75. Extrusion of Nickel Alloys. *Machinery (London),* v. 70, Feb. 6, 1947, p. 163-170.

Equipment and procedures employed at Henry Wiggin & Co., Ltd.

19-76. Tension Sizing of Small Diameter Seamless Pipe and Tubing. *Iron and Steel Engineer,* v. 24, Feb. 1947, p. 87-97; discussion, p. 97-100, 104.

Data obtained by the stretch reducing mill committee of National Tube Co., Pittsburgh. Disadvantages of the conventional sinking-sizing process; improvements of sizing mill operation by use of tension; design features of the stretch-reducing mill; characteristics of the process developed by performance tests; factors which determine wall reduction; factors affecting end-thickening of the wall of the reduced tube; factors involved in motor design.

19-77. The Rolling of Metals: Theory and Experiment. (Continued.) Part XIV. L. R. Underwood. *Sheet Metal Industries,* v. 24, Feb. 1947, p. 299-306, 310.

Methods of calculating roll load and the rolling horsepower. Practical examples. (To be continued.)

19-78. Practical Problems of Light Presswork Production. (Continued.) J. A. Grainger. *Sheet Metal Industries,* v. 24, Feb. 1947, p. 321-328.

Classifies, illustrates and describes various mechanical presses. (To be continued.)

19-79. Metal Manipulation by Stretch Forming. R. Smith. *Sheet Metal Industries,* v. 24, Feb. 1947, p. 372-374.

A section stretching machine. Difficulty of control and modifications necessary to effect economy of material for quantity production.

19-80. Fluctuations of the Distribution of Torque Between Rolling-Mill Spindles. E. A. W. Hoff. *Journal of the Iron and Steel Institute,* v. 155, Jan. 1947, p. 51-54.

Fluctuations of torque found when the torques acting in the two connecting spindles of a two-high rolling mill were recorded separately and independently during the operation of the mill. None of the fluctuations found could have originated from the universal joints of the spindles.

19-81. Precision Forgings. Fred P. Peters. *Scientific American,* v. 176, March 1947, p. 105-107.

Operations employed to produce contoured wheel forgings. Alloys used in precision forgings.

19-82. Improvement of Creep Resistance by Cold Work. H. Zschokke. *Engineers' Digest (American Edition),* v. 4, Feb. 1947, p. 82-85.

Influence on creep resistance at different temperatures of initial cold work was investigated for three temperature-stable Cr-Ni steels of 18-8 type. Bars rolled at varying end temperatures. with a reduction of 20% in the last pass were tested without further treatment. (Condensed from *Brown Boveri Mitteilungen,* v. 33, Sept. 1946, p. 227-233.) 15 ref.

19-83. Thread Forming in Thin Metal. Wallace C. Mills. *American Machinist,* v. 91, March 13, 1947, p. 101-104.

Rolling tools and their application to forming of threads, heads and knurls.

19-84. Variable-Speed Press Jumps Output. Joseph I. Karash. *American Machinist,* v. 91. March 13, 1947, p. 112-115.

Practice whereby adjustable-speed drive applied to inclined punch press gives two to three times unit production with repeat-stroke operation and properly designed dies.

19-85. Wire Rod Rolling. *Wire Industry,* v. 14, Feb. 1947, p. 93-94.

Description of Hermann Goring Werke A.G. at Salzgitter taken from the B.I.O.S. Final Report No. 625, "German Wire Rod Milling Industry."

19-86. Form Tools. (Continued.) William F. Walker. *Edgar Allen News*, v. 25, Feb. 1947, p. 762-764.

Composite tools—tools with carbon steel shanks and ends of high speed steel welded to the shank. (To be continued.)

19-87. Extrusion of Magnesium. C. S. Harris. *Machinery*, v. 53, March 1947, p. 143-152.

Methods of producing extended parts in various shapes from a huge 5500-ton press and other extrusion presses at the Dow Chemical Co.

19-88. Automatic Forming and Assembling of Condenser Fins. Charles H. Wick. *Machinery*, v. 53, March 1947, p. 165-171.

Hubs of condenser fins are pierced and drawn, and the fins are sheared from strip stock and pressed with the correct spacing on U-tubes by means of an automatic machine. Increased production and a great saving in labor have been effected by this method of assembly, which requires only one operator to attend each machine. Previously, ten operators were needed to produce an equal number of condensers.

19-89. Cupping 27% Chromium-Iron. Carter C. Higgins. *Metal Progress*, v. 51, March 1947, p. 443.

How cups several diameters long of the above material are cold drawn at Worcester Pressed Steel Co.

19-90. Blanking, Piercing and Forming. J. W. Sladden and H. S. Walker. *Metal Industry*, v. 70, March 7, 1947, p. 143-145.

The methods employed in the development of zinc alloy press tools for the fabrication of sheet metal parts by the Bristol Aeroplane Co., Ltd. (Paper presented before the Sheet and Strip Metal Users' Technical Association. To be continued.)

19-91. Moldings by the Mile at Herron-Zimmers Moulding Co. P. D. Aird. *Modern Industrial "Press"*, v. 9, March 1947, p. 13-14, 18, 42.

Equipment and procedures employed for various parts produced.

19-92. Deep Drawn Magnesium Parts Save Weight. R. G. Gillespie. *Materials & Methods*, v. 25, March 1947, p. 86-89.

How an oil filter, part of an aircraft de-icing system, was designed for fabrication from magnesium by deep drawing. Canoe and wheelbarrow as examples of large-sized work done in magnesium alloys by press-forming.

19-93. Loading-Unloading Fixture for Presses. Kenneth Rose. *Materials & Methods*, v. 25, March 1947, p. 132.

Device consists of a slotted circular disk revolving horizontally about a center on the press table; it is so positioned as to bring the workpieces under the ram of the press at some station in the circle. The workpieces fit into slots in the disk. The motion of the disk is controlled to move the disk through a fraction of a revolution equal to the number of slots provided.

19-94. Mechanical Cold Drawbenches for Ferrous and Non-Ferrous Tubes. G W. Garwig and A. L. Thurman. *Blast Furnace and Steel Plant*, v. 35, March 1947, p. 348-354, 356.

Describes drawbenches and gives a brief history of their development. Various components.

19-95. Discussion of Mill Motor Standards. Frank W. Cramer. *Iron and Steel Engineer*, v. 24, March 1947, p. 67-71; discussion, p. 71-78.

Proposed increase in power of rolling-mill motors for given motor-frame sizes.

19-96. Tool Design Streamlines Drawing Practice. G. W. Birdsall. *American Machinist*, v. 91, March 27, 1947, p. 77-81.

Various drawing operations involved in producing aluminum utensils with triple-thick bottoms, requiring heavy ironing and unique bulging die designs. Sidewall hardness is doubled by three ironing steps.

19-97. Rules for Drawing Round Shells. Parts I and II. *American Machinist*, v. 91, March 27, 1947, p. 135, 137.

A draw reduction table which offers a simple means of determining per cent of draw reduction and flat blank diameter. Table can only be used with round straight-sided shells or cups.

19-98. Deep Drawing Aluminum. *Reynolds Metals Technical Advisor*, v. 1, no. 3, p. 1.

Process is illustrated by drawings.

19-99. Service to the West. *Western Metals*, v. 5, March 1947, p. 36-39.

Pictorial story of Pacific Tube Co.—the first and only privately-owned steel tube mill west of the Rockies.

19-100. Nota Prévia Sobre a Producao de Invar. (Preliminary Note on the Production of Invar.) A. H. de Silveira Feijo. *Boletim da Associacao Brasileira de Metais*, v. 3, Jan. 1947, p. 79-93; discussion, p. 94.

Difficulties encountered in production of ingots and in rolling and drawing them into bars and wires for use as standards.

19-101. The Rolling of Metals: Theory and Experiment. Part XIV. (Continued.) L. R. Underwood. *Sheet Metal Indus-*

tries, v. 24, March 1947, p. 531-538, 540.
Methods used in practice for the calculation of rolling load and horsepower. (To be continued.)

19-102. Practical Problems of Light Presswork Production. (Continued.) J. A. Grainger. *Sheet Metal Industries,* v. 24, March 1947, p. 549-552.
Rating of presses; types of clutch; care of presses, lubrication, maintenance and periodic checking. (To be continued.)

19-103. The Development of Zinc Alloy Tools for Blanking, Piercing and Forming Sheet Metal Parts. J. W. Sladden and H. S. Walker. *Sheet Metal Industries,* v. 24, March 1947, p. 567-581, 586; *Aircraft Production,* v. 9, March 1947, p. 115-119.
The various aspects of tooling for the drop hammer and stretcher press. A method developed for blanking light alloy metals by means of zinc alloy, and use of zinc alloy in manufacturing press tools for deep drawing on double-action presses, as applied to short-run manufacture of motor-car body panels.

19-104. Blanking, Piercing and Forming. (Continued.) J. W. Sladden and H. S. Walker. *Metal Industry,* v. 70, March 21, 1947, p. 183-185.
Discussion of development of zinc alloy tools for sheet-metal parts. (To be continued.)

19-105. Hot Rolling. Henry Vita. *Metal Industry,* v. 70, March 21, 1947, p. 193.
Notes on the production of light-alloy slabs.

19-106. Blanking, Piercing and Forming. (Continued.) J. W. Sladden. *Metal Industry,* v. 70, March 28, 1947, p. 203-205.
Development of zinc alloy tools for sheet-metal parts. (To be concluded.)

19-107. Mechanical Cold Drawbenches for Ferrous and Nonferrous Tubes. Part II. G. W. Garwig and A. L. Thurman. *Blast Furnace and Steel Plant,* v. 35, April 1947, p. 461-466.
The electrical equipment used in connection with the drawbenches manufactured by Aetna-Standard Engineering Co.

19-108. Progressive Metalworking Dies Increase Output of Stampings. Gerald Eldridge Stedman. *Production Engineering & Management,* v. 19, April 1947, p. 78-81.
Production rate of 125 small, precise parts per minute is being obtained at Knapp-Monarch with five-stage progressive dies on high-speed metalworking presses.

19-109. Sectional Rope Units. Richard Saxton. *Wire and Wire Products,* v. 22, April 1947, p. 284-285, 316-317.
The processes of their production.

19-110. Preventive Maintenance of Spring Coiling Machines and Some Spring Coiling Experiments. C. R. Bergevin. *Wire and Wire Products,* v. 22, April 1947, p. 288-292.
Some production faults that may be encountered and the manner in which the troubles may be run down and corrected or prevented. Details of certain experiments to find ways and means of increasing the general usefulness and capacity of standard machines.

19-111. A High-Production Progressive Die. F. E. Baldwin and H. Effgen. *Tool & Die Journal,* v. 13, April 1947, p. 70-72, 144.
A die into which three $\frac{7}{32}$-in. strips of aluminum sheet stock of 0.038 in. thickness are fed from the right. After passing through five successive stations, a finished piece is ejected at each stroke of the press.

19-112. Forming Sheet-Metal Cabinets. Cyril J. Bath. *Machinery,* v. 53, April 1947, p. 184-187.
Various machines and operations performed on them.

19-113. Compound Die for Blanking and Forming Part With Curled Edge. John E. Hallberg. *Machinery,* v. 53, April 1947, p. 193-194.
Ribbed, curled-edge ash trays are blanked and completely formed from a strip of aluminum, 4⅛ in. wide by 0.012 in. thick, in one operation by a compound die. Material is fed through the die continuously, from left to right, and the formed ash trays are ejected by compressed air.

19-114. Press Forms Four-Part Magnesium Canoe. Chester S. Ricker. *American Machinist,* v. 91, April 10, 1947, p. 96-97.
Pictures with explanatory notes tell how sheets, extrusions, and castings make 16-ft. unit weighing less than 50 lb.

19-115. Fundamentals of Forging. Anderson Ashburn. *American Machinist,* v 91, April 10, 1947, p. 109-124.
Methods of forging and the equipment and dies that are used.

19-116. "Fluid Punch". *Steel,* v. 120, April 14, 1947, p. 90-91, 118.
Use of one die section and water under high pressure in place of mechanical punch characterizes process which permits the drawing of difficult shapes in single operation.

19-117. Six-Stage Progressive Die Operation. *Steel,* v. 120, April 21, 1947, p. 88-89. 135.
Produces entire blade sections for multivane centrifugal-blower wheels, cutting costs by 30%.

19-118. Forming Magnesium Alloys. Allen G. Gray. *Steel,* v. 120, April 21, 1947, p. 91, 126, 128, 130, 132, 134.

Main difference in the tools and technique is necessitated by the fact that many forming operations must be performed at elevated temperatures, due to a close-packed hexagonal crystal structure. (To be continued.)

19-119. Cold Extrusion. *Federal Science Progress,* v. 1, May 1947, p. 35-37.

Cold extrusion of steel as developed in Germany during the war. Bonderizing the surface facilitates the process. Possibilities of application in U. S.

19-120. Découpage, Percage, Formage, Emboutissage sur Coussins de Caoutchouc. (Cutting, Piercing, Forming, and Stamping Using Rubber Cushions.) *Revue de l'Aluminium,* v. 24, Jan. 1947, p. 29-35.

The use of rubber cushions between the work and the tool as an aid in operations on aluminum sheet. The techniques used for different situations; dimensional information given in tables.

19-121. Zinc-Alloy Press Tools. Part II. J. W. Sladden and H. S. Walker. *Aircraft Production,* v. 9, April 1947, p. 145-149.

Drop-hammer and stretching-press technique; preparation and use of blanking dies in K. M. alloy; some cost comparisons.

19-122. Forming Magnesium Sheet. L. M. Oldt. *Western Machinery and Steel World,* v. 38, April 1947, p. 82-86, 107.

Drawing, stamping, and pressing operations with brief references to stretch-forming and spinning. Equipment and lubricants.

19-123. A Process of Augmenting Cold Drawability of the Magnesium +1.5% Manganese Alloy. Louis A. Carapella and William E. Shaw. *Metals Technology,* v. 14, April 1947, T. P. 2149, 8 p.

Drawability at room temperature can be increased from 25% using current commercial techniques, to 40% by intermittent application of successively higher deformational loads. The proposed method is also recommended for improvement of deep drawing performance over a wide temperature range. Large increases in hardness have also resulted from this forming method.

19-124. Forming of Aluminum and Alloys by Drop Stamp. *Light Metal Age,* v. 5, April 1947, p. 6-9, 32.

Rope-operated and air-operated drop stamps plus tools utilized for both.

19-125. Panel Beating Aluminum. *Modern Metals,* v. 3, April 1947, p. 24-25.

Technique of panel beating; hollowing and raising methods; planishing; tools for panel beating; "split-and-weld" system of panel beating.

19-126. Magnesium Extrusions Offer Fabrication Economies. Herbert Chase. *Materials & Methods,* v. 25, April 1947, p. 96-99.

Typical examples of magnesium alloy extrusions including bars, tubes, and special shapes. Applications.

19-127. Proper Selection of Steel Simplifies Deep Drawing. G. B. Nisbet. *Materials & Methods,* v. 25, April 1947, p. 108-112.

Analyses of deep drawing steels; their physical properties; elimination of stretcher strains; die materials; die abrasion and lubrication.

19-128. The Rolling of Metals: Theory and Experiment. Part XIV. (Continued.) L. R. Underwood. *Sheet Metal Industries,* v. 24, April 1947, p. 753-757.

Methods used in practice for the calculation of rolling load and horsepower. (To be continued.)

19-129. Practical Problems of Light Presswork Production. (Continued.) J. A. Grainger. *Sheet Metal Industries,* v. 24, April 1947, p. 761-768.

Mechanical lubrication vs. manual lubrication; hand lubrication; hydraulic vs. mechanical presses for drawing; requirements in a mechanical press; hydraulic presses; operating features.

19-130. Metal Manipulation by Stretch Forming. (Continued.) R. Smith. *Sheet Metal Industries,* v. 24, April 1947, p. 787-792.

Pre-forming; types of blocks; tooling economies; dual-purpose blocks; a universal machine; block design.

19-131. The Heating and Rolling of Strip Steel. Paul Carnahan. *Iron and Steel Engineer,* v. 24, April 1947, p. 71-75; discussion, p. 75-76.

Principles of operation of the modern continuous wide strip mill.

19-132. The Corrugating of Sheet Metal. J. E. Kiefer. *Iron and Steel Engineer,* v. 24, April 1947, p. 95-101; discussion, p. 101.

The machinery used to make sheet having a variety of corrugation designs other than the conventional type.

19-133. Body Stampings Pour in a Steady Stream From Huge Presses at Kaiser-Frazer Corp. P. D. Aird. *Modern Industrial Press,* v. 9, April 1947, p. 13-14, 16, 18, 28.

Equipment and procedures employed.

19-134. Modernization at the Sheffield Forge and Rolling Mills Co., Ltd. *British Steelmaker,* v. 13, April 1947, p. 187-191.

New rod mill and its lubrication system.

19-135. Rolling Loads. Eustace C. Larke. *Metal Industry,* v. 70, April 4, 1947, p. 223-225.

Factors affecting the magnitude of rolling load. Effects of surface condition, of deforming tools, of initial thickness, of roll diameter, resistance to homogeneous deformation, and dis-

tribution of pressure on the roll face. (Paper presented before the Midland Metallurgical Societies.)

19-136. Blanking, Piercing and Forming. (Concluded.) J. W. Sladden and H. S. Walker. *Metal Industry,* v. 70, April 4, 1947, p. 227-228.
Development of zinc alloy tools for sheet-metal parts.

19-137. Rolling Loads. (Continued.) Eustace C. Larke. *Metal Industry,* v. 70, April 11, 1947, p. 243-245.
Diagrams show examples of distribution of pressure when compressing cylinders; effect of roll surface on rolling load and roll-face pressure; roll-face pressure distribution when rolling mild steel; increasing deforming load for decreasing initial thickness; variation of arc of contact with roll diameter; increasing resistance to deformation for increasing initial area of contact.

19-138. Washington Steel Starts Sendzimir Mill. *Iron Age,* v. 159, April 24, 1947, p. 63-64.
New mill proves capable of rolling stainless steel to extra thin gages and widths up to 36 in., holding finish and gage consistently throughout the coil. Production to be about 1500 tons of extra-light-gage stainless monthly.

19-139. Forming Magnesium Alloys. Part IX. Allen G. Gray. *Steel,* v. 120, April 28, 1947, p. 105-106, 138, 140, 145-146.
Drawing, hand and stretch forming, bending extrusions, spinning and forging techniques. (To be continued.)

19-140. New Company Makes Stainless Steel Sheets and Strips. *Steel,* v. 120, April 28, 1947, p. 118-120, 123.
How precision cold rolling equipment, annealing and pickling, slitting and shearing facilities convert 1500 to 1700 tons per month of hot rolled stainless into sheets and strip.

19-141. Forging Practice. Anderson Ashburn. *American Machinist,* v. 91, May 8, 1947, p. 117-132.
What constitutes current practice and how it varies for the various forgeable materials. Testing and inspection programs.

19-142. Allowances for 90° Bends in Sheet Steel. Part I and II. Alf J. Abrahamsen. *American Machinist,* v. 91, May 8, 1947, p. 167, 169.
Square and reverse bends. Fractions and decimal equivalents and weights of sheet steel per sq.ft. in gage numbers 10 to 24 inclusive.

19-143. 80-In. Cold Reduction Reversing Strip Mill at Messrs. John Summers and Sons, Ltd., Shotton, Chester. *Journal of the Iron and Steel Institute,* v. 155, March 1947, p. 442-444.
Layout of new mill and how it fits into general plant design.

19-144. Cold Working and Recrystallization of 70-30 Cartridge Brass. Charles A. Nagler and Ralph L. Dowdell. *Metallurgia,* v. 35, April 1947, p. 285-289.
Details of an extensive experimental program on the relationships between cold reduction, annealing temperature, and hardness. Results tabulated, charted, and illustrated by an excellent series of photomicrographs.

19-145. Fabricating Stainless Steel Equipment. H. Seymour. *Petroleum,* v. 10, April 1947, p. 85-86.
Petroleum refinery and laboratory equipment fabrication techniques include shearing and slitting, blanking and punching, drawing, spinning, surface finishing, and cleaning of drawn parts.

19-146. Rolling Loads. (Concluded.) Eustace C. Larke. *Metal Industry,* v. 70, April 18, 1947, p. 263-265.
Factors affecting their magnitude: distribution of roll-face pressure; distortion of roll-contact surface; effect of coiler and decoiler tension.

19-147. Substantial Processing Economies With Nonferrous Forgings. B. B. Caddle. *Production Engineering & Management,* v. 19, May 1947, p. 51-56.
Treatise on the manufacture and use of nonferrous forgings; their cost-saving potentialities.

19-148. Functional Press Layout Provides Direct Material Flow. *Production Engineering & Management,* v. 19, May 1947, p. 63-64.
New body presses recently installed at Kaiser-Frazer Willow Run plant produce panels for more than 1500 bodies daily.

19-149. Cutting Material and Production Costs With Shot-Peening. R. A. La Combe. *Production Engineering & Management,* v. 19, May 1947, p. 75-79.
Recent developments in shot-peening methods and equipment which have greatly extended the number of applications on which process may be used. New safety factors and production economies reported by users.

19-150. Hydraulic Presses Establish Production Gain. *Production Engineering & Management,* v. 19, May 1947, p. 80-81.
How constant ram velocity and accurate pressure control which are inherent in hydraulic presses have enabled Servel, Inc., to eliminate one operation formerly required for the deep drawing of embossed refrigerator doors.

19-151. Pacific Northwest Plant Rolls Merchant Bars. Gerald Eldridge Stedman. *Steel,* v. 120, May 12, 1947, p. 128-130, 132.
Oregon steelmaker employs double slag in refining electric-furnace heats. Eight pouring pits provide for 250

molds. Spreader bar facilitates stripping from four to six ingots from their molds simultaneously.

19-152. The Application to Shaping Processes of Hencky's Laws of Equilibrium. E. Siebel. *Journal of the Iron and Steel Institute,* v. 155, April 1947, p 526-534.

Increase in pressure along slip lines, and the relationship between the mean pressure and the principal stresses as well as between the slip lines and the stress trajectories. Rules regarding the formation of slip lines. The gradual advance of slip layers in direct compression processes. Slip lines and stress conditions in cupping and related processes with consideration to die friction and the cohesion of the metal. Slip lines and stress conditions in pressing processes; various systems of slip layers. Effect of workhardening explained mathematically.

19-153. Tube Bending. C. F. Moore. *Refrigerating Engineer,* v. 53, May 1947, p 409-411.

Shop tools and techniques for the bending of metal tubes of different sizes and materials to different radii.

19-154. Mechanical Cold Drawbenches for Ferrous and Nonferrous Tubes. Part III. G. W. Garwig and A. L. Thurman. *Blast Furnace and Steel Plant,* v. 35, May 1947, p. 549-552.

Auxiliary drives and control equipment. (Concluded.)

19-155. Drawing and Forming With Zinc Alloy Dies. S. Menton. *Steel,* v. 120, May 26, 1947, p. 92-93, 100, 102, 104, 107.

Use of Kirksite-type zinc alloys in production of automotive body parts. Physical characteristics and costs are compared with those of other materials. (To be continued.)

19-156. Progress in Steel Pipe Manufacture With Particular Reference to Seamless Pipe. E. N. Sanders. *American Iron and Steel Institute Preprint,* 1947, 9 p.

Development and important features of improved mill for sizes below 4½ in. O.D., being built by National Tube Co. at Lorain, Ohio.

19-157. The Joliet Coarse Rod Mill. R. R. Snow. *American Iron and Steel Institute Preprint,* 1947, 8 p

Mill designed for high production of quality rods from billets 2½ in. x 2½ in. x 30 ft. over a range of rod sizes from 11/32 to 55/64 in., inclusive.

19-158. Design of a Mill for Rolling Semifinished Products. J J. Curtin. *American Iron and Steel Institute Preprint,* 1947, 12 p.

Operator's problems in selecting the type and kind of mill that will answer his needs.

19-159. Heavy 75ST Spar Caps Bent. P. F. Girard. *Western Machinery and Steel World,* v. 38, May 1947, p. 101, 119.

How Ryan Aeronautical Co. has completed the severe bending of some of the heaviest spar caps made of 75ST aluminum alloy. Work was accomplished in the engineering laboratory on an experimental basis for a jet-plus-propeller Navy fighter.

19-160. Motor Selection for a Rolling Mill. L. H. Berkley. *Electrical Engineering,* v. 66, May 1947, p. 444-447.

Methods of analysis and calculations for a small brass-slab rolling mill can be applied to other installations.

19-161. Control of Raw Materials and Processes Assures Quality Aluminum Forgings. Lawrence J. Barker. *Materials & Methods,* v. 25, May 1947, p. 63-67.

Using Alcoa 14S alloy as a basis, unsatisfactory forged-aluminum parts can be avoided if stock is checked for hardness and surface defects and if proper dies and heat treatment are employed.

19-162. Processes Have Families. Edwin Laird Cady. *Scientific American,* v. 176, June 1947, p. 249-251.

Developments in clad steels, cutting tools, and materials.

19-163. Plate Mills. C. F. Buente *United Effort,* v. 27, May 1947, p. 7-10.

Selection of equipment for rolling plates.

19-164. Forging Die Design. John Mueller. *Steel Processing,* v. 33, May 1947, p. 294-296.

The use of "grouping" to reduce the number of hammer blows and the amount of metal flash for a given number of forgings.

19-165. Wartime Forging; the Manufacture of Bomb Suspension Lugs. E. S. Gregory, W. J. Davies and E. R. Wellburn. *Iron and Steel,* v. 20, May 1947, p. 189-190, 192.

Procedures and special techniques utilizing machines designed for shell manufacture instead of drop forging, because of shortage of facilities for the latter.

19-166. Flexibility in Heavy Stampings. P. D. Aird. *Modern Industrial Press,* v. 9, May 1947, p. 13-14, 18, 38.

Daily production experience and routine of the Metal Fabricating Co., Detroit.

19-167. Stamping and Drawing of Cutlery and Silverware. Floyd McKnight. *Modern Industrial Press,* v. 9, May 1947, p. 22, 24, 26, 28.

How various tableware items are formed and plated. Types of machines and operations at several plants.

19-168. Press Work Important in Custom Fabrication of Switchboards. Walter Rudolph. *Modern Industrial Press,* v. 9, May 1947, p. 32, 34, 36.

Modern press equipment, special dies and procedures at Pelham Electric Manufacturing Corp., Erie, Pa.

19-169. Presses Produce Jet Fighter Parts. Howard E. Jackson. *Modern Industrial Press,* v. 9, May 1947, p. 40, 42, 44.

Equipment and procedures at Ryan Aeronautical Co.

19-170. Transfer Presses Boost Output at AC Spark Plug. Hubert L. Curtis. *American Machinist.* v. 91, May 22, 1947, p. 100-101.

How transfer presses aid production of metal stampings.

19-171. Die Design for Aluminum Alloys. E. W. Mason. *American Machinist,* v. 91, May 22, 1947, p. 102-104.

Press capacity, drawing-die materials, recommended lubricants and compression operations.

19-172. Drawing and Forming Steel With Zinc Alloy Dies. Part II. S. Menton. *Steel,* v. 120, June 2, 1947, p. 104-105, 128, 132, 134, 136, 138-140.

Factors in die designing, importance of alloy plasticity, use of inserts, binder rings.

19-173. New Tandem Cold Mill Rolls Strip at Mile a Minute. J. C. Sullivan. *Steel,* v. 120, June 2, 1947, p. 118, 121-122, 124.

First of new fast mills placed in production at Weirton designed with individually driven work rolls. Acceleration from 500 ft. per min. threading speed to 4000 ft. per min. rolling speed attained in 9 sec. Mill handles 15-ton coils.

19-174. Plastic Drop Hammer Dies. Gilbert C. Close. *Light Metal Age,* v. 5, May 1947, p. 9-10.

For forming of aluminum at the El Segundo plant of Douglas Aircraft.

19-175. The Rolling of Metals: Theory and Equipment. Part XIV. Methods Used in Practice for the Calculation of Rolling Load and Horsepower. (Continued.) L. R. Underwood. *Sheet Metal Industries,* v. 24, May 1947, p. 953-962.

Methods illustrated by two examples: Two-high single-stand sheet mill with plain bronze grease-lubricated roll-neck bearings and reversing four-high single-stand high-speed strip mill with motor-driven coilers and fluid-film or roller bearings. (To be continued.)

19-176. Practical Problems of Light Presswork Production Presses. (Continued.) J. A. Grainger. *Sheet Metal Industries,* v. 24, May 1947, p. 965-966, 970.

The action of the fast-traversing hydraulic press. (To be continued.)

19-177. Some Comments on the Merits of Hydraulic and Mechanical Presses for Sheet Metal Drawing. *Sheet Metal Industries,* v. 24, May 1947, p. 967-970.

Several comments on J. A. Grainger's article in the April issue.

19-178. Discussion of Technical Papers at the Winter Conference of the Sheet and Strip Metal Users' Technical Association. *Sheet Metal Industries,* v. 24, May 1947, p. 1009-1013.

Discusses the development of zinc alloy tools for blanking, piercing and forming sheet metal parts, by J. W. Sladden and H. S. Walker. Methods of studying the behavior of steel during welding, by H. Granjon.

19-179. The Joliet Coarse Rod Mill. R. R. Snow. *Blast Furnace and Steel Plant,* v. 35, June 1947, p. 687-690.

Joliet mill built 14 ft. above grade allowing room beneath for offices and equipment. Proper arrangement of supplies for continuous feeding. Furnaces. The construction of the mill. Reels on which rod is wound. Finishing and shipping. (Abstract of a paper read at meeting of American Iron and Steel Institute, New York, May 21 and 22, 1947.)

19-180. Progress in Steel Pipe Manufacture With Particular Reference to Seamless Pipe. E. N. Sanders. *Blast Furnace and Steel Plant,* v. 35, June 1947, p. 691-694.

Types of pipe produced. Need for operating economy. Production of seamless pipe and the seamless mill. (Abstract of paper read at meeting of American Iron and Steel Institute, New York, May 21 and 22, 1947.)

19-181. Design of a Mill for Rolling Semifinished Products. J. J. Curtin. *Blast Furnace and Steel Plant,* v. 35, June 1947, p. 702-706.

Size of product to be rolled, source of steel supply, quality of product and tonnage required affect choice of rolling mill. General construction features and advantages of continuous mills which follow and operate in line with blooming mill, cross-country mill and the three-high billet mill. (Abstract of a paper read at meeting of American Iron and Steel Institute, New York, May 21 and 22, 1947.)

19-182. Forging Developments at Oldsmobile Plant. *Automotive and Aviation Industries,* v. 96, June 1, 1947, p. 46.

Picture story of improved techniques.

19-183. Reversing and Tandem Cold Mills. M. D. Stone. *Iron and Steel Engineer,* v. 24, May 1947, p. 65-72; discussion, p. 72.

A comparison of the tandem mill with the reversing mill emphasizes the point that the reversing mill offers lower investment cost and greater

flexibility, whereas the tandem mill gives lower operating cost and greater production.

19-184. Form Tools. (Continued.) W. F. Walker. *Edgar Allen News,* v. 25, May 1947, p. 827-828.

Circular form tools. (To be continued.)

19-185. The Cold Heading Process. F. Rhodes. *Machinery (London),* v. 70, May 1, 1947, p. 449-451.

Its advantages and extending field of application.

19-186. Hot Dimpling and Joggling 75S-T for the DC-6's. Floyd E. Bryan and Don E. Bailey. *Machinery,* v. 53, June 1947, p. 146-150, 189.

Practice of the Douglas Aircraft Co. in extensive application of new high-strength aluminum alloy.

19-187. Forming Aluminum Sheets Into High-Strength Structures. Bernhard Rogge. *Machinery,* v. 53, June 1947, p. 174-179.

How sheet-metal structures, formed into a waffle-bead pattern by drop-hammers or hydraulic presses, are being used for such airplane parts as engine cowlings, floor panels, outer wing sections, and door panels at Glenn L. Martin Co.

19-188. Drawing and Forming Steel With Zinc Alloy Dies. S. Menton. *Steel,* v. 120, June 16, 1947, p. 94-96, 122, 124, 127-128, 130.

Finishing operations on draw and forming dies, press tryouts, pressure-equalizing blocks, rebuilding or modifying dies, as well as other applications. (Concluded.)

19-189. Production Processes. Their Influence on Design. Part XXIV. Press Brake Forming. Roger W. Bolz. *Machine Design,* v. 19, June 1947, p. 137-142.

Types of items which should be made by press-brake forming and principles for their design.

19-190. Extrusion Method of Manufacturing Tubes. Hugo Lorant. *Mechanical Engineering,* v. 69, June 1947, p. 471-474.

Process as used for tubes of stainless steel, special steel, nickel, monel, and Inconel.

19-191. Making Hand-Wrought Copper Products. M. G. Hawkins. *Modern Machine Shop,* v. 20, June 1947, p. 156-158, 160.

Most forming is accomplished by spinning. Fluting, annealing, hammering, trimming of copper articles at Empire Copper Works, Seattle, Wash.

19-192. Stamping Body Panels at Kaiser-Frazer. *Machine and Tool Blue Book,* v. 43, June 1947, p. 159-160, 162, 164, 166, 168.

Three to nine stamping operations are required to turn out each body panel. Larger body presses range in capacity from 350-ton single-action to 1500-ton triple-action.

19-193. Rolling Mills. E. A. W. Hoff. *Iron and Steel,* v. 20, May 23, 1947, p. 216-217.

Fluctuations of torque distribution between spindles as measured by electric-resistance strain gages.

19-194. Shaping Processes. E. Siebel. *Iron and Steel,* v. 20, May 23, 1947, p. 266-268.

Application of Hencky's laws of equilibrium to various forming processes.

19-195. Rolling Mill Research. *Iron and Steel,* v. 20, May 23, 1947, p. 278-280.

An abstract of the first report of the Sub-Committee of the Iron and Steel Industrial Research Council.

19-196. Pressworking of Stainless Steels. C. W. Hinman. *Steel Processing,* v. 33, June 1947, p. 355-357.

Properties of Cr-Ni stainless; drawing, polishing, and pressworking; and blanking small work in carbide dies.

19-197. Fuselage-Frame Production. S. C. Poulsen. *Aircraft Production,* v. 9, June 1947, p. 203-208.

Six-stage rolling machine for simultaneous forming and curving of circular frames from flat strip.

19-198. Drawing Die Problems and Formulas. Part III. James Walker. *Tool Engineer,* v. 18, June 1947, p. 35-38.

Selection of presses.

19-199. Versatile New Press Speeds Die Tryout. Gunnar Skog. *Tool Engineer,* v. 18, June 1947, p. 44.

Novel design incorporates positioning to provide on-the-spot corrections.

19-200. Servicing of Dies. *Wire and Wire Products,* v. 22, June 1947, p. 432-433, 462-463.

Maintenance of wire-drawing dies discussed in the form of a hypothetical conversation between the field investigator for a die manufacturer and the manager of a plant using them.

19-201. Experimentation on Tube Drawing With a Moving Mandrel. G. Espey and G. Sachs. *Journal of Applied Mechanics,* v. 14 *(Transactions American Society of Mechanical Engineers,* v. 69), June 1947, p. A81-A87.

In the process of tube drawing with a moving mandrel, the frictions act in different directions on the two contact surfaces between metal and tools. Therefore, the analysis of such a process yields rather complex relations. These were confirmed by experimentation on several materials exhibiting various degrees of strain hardening.

19-202. The Flow of Metals Through Tools of Circular Contour. G. Sachs

and L. J. Klingler. *Journal of Applied Mechanics,* v. 14 *(Transactions American Society of Mechanical Engineers,* v. 69*),* June 1947, p. A88-A98.

In a large variety of commercial forming processes, metal flows through a gap formed by the surfaces of parallel cylinders. One of these processes is rolling, which has been investigated previously for certain boundary conditions. This analysis is extended to cover all possible variations.

19-203. Speed Stability of Motors for Continuous Mills. F. E. Crever and T. M. Linville. *Iron and Steel Engineer,* v. 24, June 1947, p. 50-58; discussion, p. 58-60.

How to minimize speed changes when sudden torque variations occur by providing inertia, or electrically by proper design of the motor.

19-204. Machinery for Roller Leveling Flat Rolled Metal. A. J. Wardle, Jr. *Iron and Steel Engineer,* v. 24, June 1947, p. 61-65, 68; discussion, p. 68.

Background, various types of machines. Number and placement of leveling rolls.

19-205. Rod Mills and Rod Mill Roll Design. Ross E. Beynon. *Iron and Steel Engineer,* v. 24, June 1947, p. 74-100.

A review of general practice.

19-206. Speed and Precision Required in Manufacture of Ford Hub Plates. P. D. Aird. *The Modern Industrial "Press",* v. 9, June 1947, p. 13-14, 16, 18.

Forming, welding, and general fabrication procedure.

19-207. Mass Production of Urban Coaches Involves Efficient Metal Working Equipment and Methods. Walter Rudolph. *The Modern Industrial "Press",* v. 9, June 1947, p. 26, 28, 32, 34.

Expansion of facilities at Twin Coach Co., Kent, Ohio, and Buffalo, N. Y. New design features. Use of aluminum alloys. Forming operations.

19-208. Machining Operations Eliminated by Formed Tubing. *Iron Age,* v. 159, June 19, 1947, p. 59.

New fabrication procedure used by National Formetal, Inc., Cleveland, to produce formed bushings and spacers having a large variety of specifications, and held to close tolerances. They are made in steel, bronze, and other copper alloys.

19-209. Successful Drawing and Redrawing Thin Metal Stampings. Wallace C. Mills. *American Machinist,* v. 91, June 19, 1947, p. 112-116.

Causes of tearing and wrinkling of thin metal and the precautions to be observed to prevent them.

19-210. The Manipulation of Magnesium Alloy Sheet and Extrusions; a Review of Published Information to Aug. 1945. (Concluded.) G. Goddard. *Magnesium Review and Abstracts,* v. 6, Oct. 1946, p. 122-131. 32 ref.

19-211. O Laminador Sendzimir Para Tiras E Chapas A Frio. (The Sendzimir Cold Strip Mill for Cold Forming Wire and Sheets.) Tibor Kessler. *Boletim da Associacao Brasileira de Metais,* v. 3, April 1947, p. 241-250.

A modern method of cold rolling and drawing. The advantages of this mill over the ordinary mill.

19-212. Use of Magnesium in Aircraft. *Light Metal Age,* v. 5, June 1947, p. 6-7.

Hot forming; dimpling; spot welding; and drop-hammer forming at Glenn L. Martin Co., Baltimore.

19-213. The Rolling of Metals: Theory and Experiment. Part XIV. Methods Used in Practice for the Calculation of Rolling Load and Horsepower. (Continued.) L. R. Underwood. *Sheet Metal Industries,* v. 24, June 1947, p. 1155-1160.

Four more illustrative examples. (To be continued.)

19-214. Practical Problems of Light Presswork Production. (Continued.) J. A. Grainger. *Sheet Metal Industries,* v. 24, June 1947, p. 1167-1170, 1174.

Procedures for press setting. (To be continued.)

19-215. Further Comments on the Merits of Hydraulic and Mechanical Presses for Sheet Metal Drawing. *Sheet Metal Industries,* v. 24, June 1947, p. 1171-1174.

W. Griffith Edwards and W. S. Rhodes comment on J. A. Grainger's article in the April issue. (To be continued.)

19-216. Die-Grams. Karl L. Bues. *Western Machinery and Steel World,* v. 38, June 1947, p. 123-124.

Die for production of precisely located hole in circular part.

19-217. Some Facts About Spinning Aluminum. *Modern Metals,* v. 3, June 1947, p. 16-17.

Some of the problems involved and the reasons why aluminum is an easy material to spin.

19-218. Form Tools. (Continued.) William F. Walker. *Edgar Allen News,* v 26, June 1947, p. 842-845.

Circular form tools, tipped tools and composite tools. (To be continued.)

19-219. Small Sections Contoured by Preform Rolling. C. R. Wulffsohn. *Iron Age,* v. 159, June 26, 1947, p. 54-57.

Forming of extrusions and sheet metal stock into shapes requiring compound curvatures, contours and reverse contours and bends can be performed without the use of costly dies in a single operation by use of a simple power-roll machine. New technique offers a wide field of application in metal furniture and trim.

19-220. For Deep Drawing. Mechanical or Hydraulic Presses? *Tool & Die Journal,* v. 13, July 1947, p. 70-75.

An evaluation of factors influencing the selection of presses for specific jobs. Data were obtained from both a large manufacturer and a large user of mechanical and hydraulic presses.

19-221. Production Up, Downtime Down. *Tool & Die Journal,* v. 13, July 1947, p. 84-86.

How use of carbides for the cutout and cupping-die portions of a nine-stage progressive die enabled Thompson Products Co., Detroit, to increase the length of runs on rod bearings for the socket tie-rod assemblies for automotive vehicles from 200,000 to 2,000,000 before die reconditioning.

19-222. Carbide Inserts Eliminate Die Servicing. *Tool & Die Journal,* v. 13, July 1947, p. 86.

Use of above in production of small steel links.

19-223. Press Tooling and Production of Electric Motors. *Tool & Die Journal,* v 13, July 1947, p. 98, 100, 102, 106F.

How problems in design of an all-steel, press-produced, fractional-horsepower, induction motor were solved.

19-224. Press Alignment of Punches and Dies. *Tool & Die Journal,* v. 13, July 1947, p. 104, 106G.

Anti-friction die sets and accessories. Experience of users shows an increase in stampings between regrinds of up to 100%, with 50% considered routine.

19-225. "Hypermatic" High-Velocity Stamping. *Tool & Die Journal,* v. 13, July 1947, p. 144.

Production results with new type of punch press. Lock washers are produced at a rate of 1700 per min. and 450,000 are produced without a die grind. The high velocity results in about 10% cut and 90% break, producing superior stampings with less burr, distortion, and draft.

19-226. Cemented Carbide Wire Straightening Dies. *Iron Age,* v. 160, July 3, 1947, p. 54.

Use of tungsten carbide for wire-straightening dies used in processing hot wire into concrete-reinforcing rods resulted in an increase in die life to more than 300 days, as compared with an average life of 2 days for chilled iron and brass dies.

19-227. Intermittent Deformation of Metals. *Metal Industry,* v. 70, June 27, 1947, p. 480.

Recent work on improving the cold drawability of a magnesium alloy.

19-228. New Press Operates at 1800 Strokes Per Min. H. E. Linsley. *Iron Age,* v. 160, July 10, 1947, p. 58-59, 127-128.

New type of punch press.

19-229. Press-Shop Operations in Making Silverware. *Machinery,* v. 53, July 1947, p. 152-153.

Blanking, drawing, forming, and trimming operations performed in the manufacture of silverware at Oneida, Ltd., Sherrill, N. Y., by use of power presses built by the E. W. Bliss Co.

19-230. Hot Forming Solves Bending Problem on 75S-T Aluminum. P. F. Girard. *Production Engineering & Management,* v. 20, July 1947, p. 63-64.

Laboratory procedure establishes feasibility of forming dihedral angle and sweepback in heavy section 75S-T extruded aluminum alloy wing spars at 300° F. at Ryan Aeronautical Corp.

19-231. Cast Plastics Drop Hammer Punch Dies. Gilbert C. Close. *Modern Machine Shop,* v. 20, July 1947, p. 166, 168, 170, 172, 174, 176, 178.

How cast ethyl cellulose plastic dies are prepared and used at El Segundo, Calif., by Douglas Aircraft, for forming sheet metal.

19-232. Liquid Power for Embossing and Drawing Sheet Metal in One Operation. *Machine and Tool Blue Book,* v. 43, July 1947, p. 189-190, 192 197, 198, 200.

Using water under high pressure and only one die section, the new Hydrodynamic method permits the drawing and embossing of large and difficult shapes in one operation without localized draw strains.

19-233. Northrup Speeds Magnesium Fabrication. Chester Ricker. *American Machinist,* v. 91, July 17, 1947, p. 119-121.

How hot forming of magnesium plate, electric dimpling, and automatic welding cut time and cost in building all-magnesium aircraft.

19-234. Shot-Peening of Springs. L. J. Wieschhaus. *Metal Progress,* v. 52, July 1947, p. 103.

Examples of variations in shot-peening results as a reply to some comments by Alberto Oreffice, in a letter in the Oct. 1946 issue. Clarifying letter from Dr. Oreffice.

19-235. Forging Anvil Resurfaced by Ingenious Setup. *Iron Age,* v. 160, July 17, 1947, p. 48.

Method used for resurfacing of a badly dented, roughened, and work hardened 69-ton steel-forging anvil without removing it from the hammer.

19-236. Hot Heading and Cold Forming Bars in Single Operation. *Iron Age,* v. 160, July 17, 1947, p. 60.

Production setup enables an operator to simultaneously produce a circular flange, a square head, and a 1-in. flat on ¼-in. round spreader bars, at the rate of 30 pieces a min., in forming concrete reinforcing bars.

19-237. Die-Grams. Karl L. Bues. *Western Machinery and Steel World,* v. 38, July 1947, p. 117-118.

Definitions of terms used by the tool engineer in connection with stamping operations. (To be continued.)

19-238. Skin Stretching. *Aircraft Production,* v. 9, July 1947, p. 243-248.
British developments in forming large airframe panels.

19-239. Details of a New 18-Inch Reversing Cold Steckel Mill. L. W. Law. *Sheet Metal Industries,* v. 24, July 1947, p. 1349-1351, 1365.
Recently installed in Britain, the mill is specially designed for the production of "Crystalloy" which is a cold reduced 3% Si electrical steel with low loss and high permeability, highly oriented in the direction of rolling.

19-240. The Rolling of Metals; Theory and Experiment. Part XIV. Methods Used in Practice for the Calculation of Rolling Load and Horsepower. (Continued.) L. R. Underwood. *Sheet Metal Industries,* v. 24, July 1947, p. 1352-1360, 1366.
Methods previously described are illustrated by another example. Methods used in the examples. (To be continued.)

19-241. Practical Problems of Light Presswork Production. (Continued.) J. A. Grainger. *Sheet Metal Industries,* v. 24, July 1947, p. 1369-1376.
Setting the feed mechanism; blank and draw tools with hand feed and mechanical feed; compound tools; follow-on tools in roll-feed presses; setting procedure; final adjustments; assembling the blankholder; earing; and subsequent draw setting. (To be continued.)

19-242. The Production of Pressed Steel Ogee Gutters; A Solution to a Practical Problem. *Sheet Metal Industries,* v. 24, July 1947, p. 1417-1418, 1420.
How the gutter section of 4½ and 5-in. gutters was formed in one operation.

19-243. Impact Extrusion. *Machinery (London),* v. 71, July 3, 1947, p. 3-11.
Application of the process to the production of radio-condenser components.

19-244. Piercing Two Holes in Alignment. *Machinery (London),* v. 71, July 3, 1947, p. 13.
Simple but unusual press tool for the above.

19-245. Shaping and Forming. Willibald Trinks. *American Iron and Steel Institute Preprint,* 1947, 24 p.
Application of the principles of plastic deformation to various metal-working processes.

19-246. Most Modern Manufacturing Method of Wrought Steel Wheels. *Engineering Materials,* v. 5, June 1947, p. 62-67.
Techniques used by American Rolling Mill Co.

19-247. High Production Lamination Tooling. *Western Machinery and Steel World,* v. 38, July 1947, p. 104-105.
Design and production of transformer, rotor, and stator laminations, and the tooling for stamping them.

19-248. Sheet and Tinplate Mills. J. H. Mort. *Iron and Steel,* v. 20, July 1947, p 351-356.
Methods used to reface the rolls used. Properties of various alloys used; the importance of neck cooling; influence of width; rolling narrow sheet on wide rolls; measurement of roll temperatures; and shapes of roll ends. Simple mathematics is applied to the calculation of proper curves for the roll surfaces. (To be continued.)

19-249. Press Forging at Chevrolet Plant, Muncie, Ind. P. D. Aird. *Modern Industrial "Press",* v. 9, July 1947, p. 13-14, 18, 22.
Methods and equipment for production of 21 different auto parts.

19-250. Modern Press Equipment Speeds Production of Butler Boulevard Home. Gerald E. Stedman. *Modern Industrial "Press",* v. 9, July 1947, p. 24, 26, 28.
Methods and equipment for production of steel prefabricated houses.

19-251. Manufacturing Wire. *Western Metals,* v. 5, July 1947, p. 20-21.
Production of wire and mesh at the Bay area plants of the California Wire Cloth Corp.

19-252. Hole Piercing and Stamping in One Operation. Ernest C. Morse. *Materials & Methods,* v. 26, July 1947, p. 80-84.
Numerous applications of piercing of holes with diameters less than the thickness of the blank, or with tolerances under 0.001 in., and piercing holes at the same time as blanking, and before forming.

19-253. Working Magnesium. James V. Winkler. *Western Metals,* v. 5, July 1947, p. 35-37.
Various tooling methods and current techniques used in forming magnesium products.

19-254. Press Shop Operations in Bicycle Production. *Machinery (London),* v. 71, July 10, 1947, p. 31-38.
Methods and equipment used at Raleigh Cycle Co., Nottingham, England.

19-255. A Mechanized Forge. *Engineer,* v. 184, July 11, 1947, p. 31-33.
Equipment and procedures at forging shop of Daniel Doncaster and Sons, Ltd., Sheffield, England.

19-256. Auxiliary Stripper Prevents Punch Breakage. *American Machinist,* v. 91, July 31, 1947, p. 77.

A recent job required punching a 0.0236-in. hole in 0.0313 sheetmetal stock, at a distance of 0.0272 in. from the edge. Piercing was a complete failure because a punch was broken at every stroke of the press no matter how carefully the press was operated. How an auxiliary stripper solved the problem.

19-257. 14-Station Die Makes Tip Clutches for Pencils. Gordon Murphy. *American Machinist,* v. 91, July 31, 1947, p 104-105.

Feed and air-ejection equipment are incorporated in progressive setup to provide 3-jaw clutch from strip for Eversharp pencils.

19-258. Copper-Manganese Alloys: The Properties of Cold Worked and Annealed Alloys Containing 2 to 20% Manganese. R. S. Dean, J. R. Long, T. R. Graham, and D. P. Sugden. *Transactions of American Society for Metals,* v. 38, 1947, p. 577-591; discussion, p. 591-592.

Influence of cold working and subsequent annealing of 60% cold worked material. 12 ref.

19-259. Calculation of Press Forging Pressures and Application to Magnesium Forgings. R. L. Dietrich and G. Ansel. *Transactions of American Society for Metals,* v. 38, 1947, p. 709-727; discussion, p 727-728.

The pressures required for forging are a function of size, shape, friction, and deformation resistance of the metal. Equations are derived for calculating the forging pressures in simple sections as a function of these variables. The data thus obtained are used to calculate the loads required for upsetting or for fairly simple die forgings. Some data for two commercial magnesium forging alloys.

19-260. Folding in the Cupping Operation. William M. Baldwin, Jr., and Thomas S. Howald. *Transactions of American Society for Metals,* v. 38, 1947, p 757-788.

Theoretical and experimental investigation of the tendency of a blank to fold when drawn into a cup. Copper, brass, aluminum in a hard and soft temper and S.A.E. 1008 steel in a soft temper were investigated. The effect of various die contours, reductions in diameter from blank to cup, and a wide range of blank thicknesses was studied. It was found possible, by purely theoretical means, to predict the tendency of a blank to fold from the stress-strain diagram. 24 ref.

19-261. Richard Johnson and Nephews' Developments. *Wire Industry,* v. 14, July 1947, p. 385, 387.

British continuous rod mill.

19-262. Samuel Fox & Co.'s Strip and Wire Plant. *Wire Industry,* v. 14, July 1947, p. 387.

New equipment modernizes plant.

19-263. Form Tools. W. F. Walker. *Edgar Allen News,* v. 26, July 1947, p. 870-871.

Circular form tools. (To be continued.)

19-264. Extruded Aluminum Freezer Compartment. *Product Engineering,* v. 18, Aug. 1947, p. 104.

In new Servel gas refrigerator, aluminum fins are formed around the freezer coils by a simple press operation.

19-265. Uses of Shot-Peening Other Than for Fatigue Durability. L. J. Wieschhaus. *Product Engineering,* v. 18, Aug. 1947, p. 122-127.

New applications of shot-peening and resistance of materials to stress-corrosion cracking.

19-266. Severe Bending of 75S-T Spar Caps. P. F. Girard. *Automotive Industries,* v. 97, Aug. 1, 1947, p. 44, 74, 86.

Setup developed at Ryan Aeronautical Corp.

19-267. Bending for Dihedral and Sweepback Simplified on Heavy 75S-T Spar Caps. *Aviation Week,* v. 47, Aug. 4, 1947, p. 18.

Combination heating-and-bending process developed at Ryan solves difficult production problem of forming large cross-section critical members.

19-268. Precipitation in a Magnesium Sheet. C. T. Haller and C. S. Barrett. *Transactions of American Society for Metals,* v. 39, 1947, p. 670-676; discussion, p 676-679.

The effect of the nature of cold work on the distribution of the precipitate in a commercial magnesium sheet. X-ray and metallographic investigations were combined in a study of the metallography of aging in a 6% Al, 1% Zn magnesium-base alloy.

19-269. The Cold Workhardening Properties of Stainless Steel in Compression. F. K. Bloom, G. N. Goller, and P. G. Mabus. *Transactions of American Society for Metals,* v. 39, 1947, p. 843-864; discussion, p. 864-867.

The cold workhardening properties of a large number of chromium-nickel and plain-chromium stainless steels were studied by a special compression test. Effects of changes in content of chromium and nickel; of carbon and of nitrogen; of admixtures of Cb, Ti, and Mo; and of heat treatment and cold working temperature variations.

19-270. The Effect of Speed of Rolling in the Cold Rolling Process. H. Ford. *Journal of the Iron and Steel Institute,* v. 156, July 1947, p. 380-398.

The effects and possible causes.

19-271. Production Processes. Part XXVI. Thread and Form Rolling. Roger W. Bolz. *Machine Design,* v. 19, Aug. 1947, p. 145-150.

Screw threads and other circular forms may be cold rolled between flat or cylindrical dies with fast production, good finish and hardening.

19-272. Tube Straightening. E. W. Wrage. *Mechanical Engineering,* v. 69, Aug. 1947, p. 648-650.
Conventional methods for straightening welded and seamless tube stock.

19-273. Stretching Characteristics of Aluminum Alloy Sheet. J. M. Taub. *American Society for Metals Preprint No. 12,* 1947. (To be published in *Transactions* for 1948.)
A number of factors which influence the stretching of aluminum-alloy sheet during press-punch operations. Most of the experimental work was conducted with a single-contoured punch. A few results using a double-contoured punch indicate that parts having a relatively shallow curvature in two directions are affected by variations in processing conditions similar to singly curved parts.

19-274. Recrystallization as a Measurement of Relative Shot-Peening Intensities. K. B. Valentine. *American Society for Metals Preprint No. 24,* 1947, 7 p. (To be published in *Transactions* for 1948.)
The phenomena of recrystallization and grain growth of a critically strained, low-carbon steel at subcritical temperature were used as a means of determining the depth of penetration of cold work induced by shot-peening. Depth of penetration is increased by increase of shot size, shot velocity, and time of peening.

19-275. The Aetna Wire Drawing Unit. Part I. E. J. P. Fisher and A. L. Thurman. *Wire and Wire Products,* v. 22, Aug. 1947, p. 582-583, 586-587.
Development, construction, and operation of continuous nonslip wire-drawing machine. (To be continued.)

19-276. Drawing Die Problems and Formulas. Part V. The Techniques of Drawing. James Walker. *Tool Engineer,* v. 19, Aug. 1947, p. 31-35.
Advanced design and construction of simple and compound drawing dies for mass production industry.

19-277. Proposed Standard Sheet for Press Forging Dies. John R. Parks. *Tool Engineer,* v. 19, Aug. 1947, p. 43-44.
How proper clearances and fine surface finish add to die life.

19-278. The Single Slot Punch and Die in the Electrical Industry. J. H. Quatkemeyer. *Tool & Die Journal,* v. 13, Aug. 1947, p. 50-52.
Application of the single slot punch and die to the manufacture of electric motors used in experimental and special projects, or to fill relatively small orders for such equipment.

19-279. Producing Automotive Valves by Extrusion. Charles H. Wick. *Machinery,* v. 53, Aug. 1947, p. 142-146.
How inlet and exhaust valves for automobile and truck engines are extruded from hot slugs of steel at the Chevrolet-Flint Mfg. Div. of General Motors Corp.

19-280. Carbide Dies Cut Laminations. Rupert Le Grand. *American Machinist,* v. 91, Aug. 14, 1947, p. 96-100.
Use in the stamping of laminated sheet parts for stators and meters.

19-281. Battleship Technique Used in New Atom Cyclotron Part. P. D. Aird. *Modern Industrial "Press",* v. 9, Aug. 1947, p. 13-14, 16.
Steel forgings of a size and shape rarely attempted have been successfully produced at the Homestead works of Carnegie-Illinois Steel Corp., for a giant cyclotron magnet to be installed in an atom smasher.

19-282. Designing of "Trouble-Free" Dies. Part LXXII. Die for Cutting Interior Scallops. C. W. Hinman. *Modern Industrial "Press",* v. 9, Aug. 1947, p. 18, 20.
How die with scallops should be designed and some problems which may be encountered.

19-283. More Expensive Dies for Less Expensive Products. E. V. Crane. *Modern Industrial "Press",* v. 9, Aug. 1947, p. 22, 24, 26.
The mass production methods of metalworking processes use carefully tooled equipment of great strength, and take advantage of the plastic properties of metals to produce an infinite variety of parts and articles at unbelievably small cost.

19-284. Carbide Sheet Metal Dies. Earle Glen. *Western Machinery and Steel World,* v. 38, Aug. 1947, p. 69-73.
Differences between dimensional designs of carbide and steel dies. Where a large die investment is involved, a try-out die is made of steel and then duplicated in carbide. This permits modifying the original design before the carbide die (with its long life of 20 or more times that of steel) is produced.

19-285. The Rolling of Metals: Theory and Experiment. Part XIV. Methods Used in Practice for the Calculation of Rolling Load and Horsepower. L. R. Underwood. *Sheet Metal Industries,* v. 24, Aug. 1947, p. 1563-1568, 1580.
Compression rate curves for various rolling temperatures; and horsepower hours per ton rolled and elongation curves.

19-286. The Physics of Sheet Steel. G. C. Richer. *Sheet Metal Industries,* v. 24, Aug. 1947, p. 1572-1580. (Continued.)
The origin of ferromagnetism; the

magnitudes of magnetization; the ferromagnetic structure, ordered regions and disordered regions. (To be continued.)

19-287. Hydraulic and Mechanical Presses for Sheet Metal Drawing. J. A. Grainger. *Sheet Metal Industries,* v. 24, Aug. 1947, p. 1587-1590.

Reply to the recent discussion of presses and press design.

19-288. The Pressing of Stainless Steel Exhaust "U" Pipes and Shrouds. T. W. Elkington. *Sheet Metal Industries,* v 24, Aug. 1947, p. 1603-1608.

Blanking, pressure forming, restriking and trimming.

19-289. Tungsten Wires; an Electrolytic Method of Pointing. W. G. Pfann. *Metal Industry,* v. 71, Aug. 8, 1947, p. 110, 112.

A simple, rapid and flexible method of pointing tungsten wire, requiring only elementary apparatus.

19-290. Shaping and Forming. Willibald Trinks. *Blast Furnace and Steel Plant,* v. 35, Aug. 1947, p. 964-970, 974, 1003, 1008.

Shaping and forming plastic bodies. Recrystallization temperatures and speeds, tension limitations, variables affecting deformation, and forging problems.

19-291. Combined Stamping Operation. E. V. Crane. *Steel,* v. 121, Aug. 25, 1947, p. 102, 120.

How both automatic feeding and multiple-operation tooling require for success a sound understanding of metalworking theory and careful attention to detail. Any of the typical operations can be put together in a suitable sequence to produce most parts in more or less finished form at one pass.

19-292. Wire Mill Practice; Instructions on the Calculation of Die Sets. W. F. G. Kerley. *Wire Industry,* v. 14, Aug. 1947, p. 443.

Procedure for calculation.

19-293. How and Why. *Machinery (London),* v. 71, Aug. 7, 1947, p. 154-155.

Production of small brass caps by extrusion; mass production of socket wrenches.

19-294. The Strengthening of Steel by Correct Hot Working Conditons. K. F. Grachev. *Engineers' Digest (American Edition),* v. 4, June 1947, p. 286.

Results of experimental investigation; practical conclusions. (Translated and condensed from *Vestnik Mashinostroenia,* no. 5-6, 1946, p. 71-73.)

19-295. New Press Tooling Speeds Hardware Production. W. J. Donaghey. *Iron Age,* v. 160, Aug. 28, 1947, p. 58-60.

Designed specifically to meet tremendous production demands for manufacture of escutcheon plates. Equipped with two crankshafts operating seven plungers and a toggle unit for coining. An ingenious die for assembling brass scalps to glass doorknobs

19-296. Cemented Carbide Used for High Production Dies and Punches. *Iron Age,* v. 160, Aug. 28, 1947, p. 64-66.

The selective application of cemented carbide in high production dies and punches at areas subjected to high wear forces offers a means of greatly increasing die runs and boosting the number of parts produced per grind.

19-297. Heating and Rolling Low Carbon Steel for Strip. N. E. Rothenthaler. *Iron and Steel Engineer,* v. 24, Aug. 1947, p 71-76; discussion, p. 76-78.

Modern technique employed to properly heat and roll steel from ingots into slabs, and from slabs into coiled strip.

19-298. Raising the Creep Limit by Cold Working. *Brown Boveri Review,* v. 33, Sept. 1946, p. 227-233.

Cold working of an annealed material produces a stiffening effect, that is, raises the strength values and increases hardness. In this way it is possible to extend the elastic range of the stress-strain diagram, in other words, to raise the point at which strain or permanent set is initially exhibited under stress. 15 ref.

19-299. Aluminum Foil. *Metal Industry,* v. 71, Aug. 22, 1947, p. 153.

Production methods employed by German technicians. (Abstracted from a recent B.I.O.S. Report.)

19-300. Auto Brake Disks Produced With Progressive Dies. Herbert Chase. *Iron Age,* v. 160, Sept. 4, 1947, p. 80-82.

Stamping of Buick brake disks in a transfer setup employing four dies in a single press. Operation of a simple stacking device which greatly facilitates the handling of circular blanks from a press.

19-301. Expanding Pipe Beyond Yield Point to Make It Rounder and Stronger. *Engineering News-Record,* v. 139, Sept. 4, 1947, p. 86-87.

How steel pipe for a natural gas line is hydraulically expanded from 29½ in. to 30 in. diameter. Additional strength results from cold working the steel.

19-302. Unconventional Dies Facilitate Difficult Forming Operations. Gerald Eldridge Stedman. *Steel,* v. 121, Sept. 8, 1947, p. 78-79, 120.

Methods and equipment used in production of toasters in St. Louis plant of Knapp-Monarch Co.

19-303. Technical Progress in the Wire Industry. R. S. Brown. *Wire and Wire Products,* v. 22, Sept. 1947, p. 658-664.
Historical review.

19-304. The Aetna Wire Drawing Unit. Part II. E. J. P. Fisher and A. L. Thurman. *Wire and Wire Products,* v. 22, Sept. 1947, p. 665-668, 679-681.
Capacities of this unit for different types and sizes of wire.

19-305. Modernized Control System Increases Blooming Mill Output. Erling Frisch. *Steel,* v. 121, Sept. 15, 1947, p. 120, 122 125.
How reduction in time required to reverse motor armature serving 44-in. blooming mill results in stepping up semifinished production.

19-306. A New Mechanized Forge. *Metallurgia,* v. 36, Aug. 1947, p. 175-178, 222.
Equipment and procedures used by British firm for the production of forgings from special steels.

19-307. The Forging of High-Temperature Alloys. *Industrial Heating,* v. 14, Sept. 1947, p. 1446, 1448.
Results reported by L. B. Fonda at recent annual meeting of A.S.M.E.

19-308. The Rolling of Metals: Theory and Experiment. Part XIV. Methods Used in Practice for the Calculation of Rolling Load and Horsepower. (Continued.) L. R. Underwood. *Sheet Metal Industries,* v. 24, Sept. 1947, p. 1769-1774, 1782.
Practical examples of the calculation of the rolling load, rolling horsepower, etc., in hot rolling; equivalent maximum torque, r.m.s. torque, and motor rating. (To be continued.)

19-309. Production Factors Affecting Grain Size in Aluminum Sheet. Raymond Chevigny. *Sheet Metal Industries,* v. 24, Sept. 1947, p. 1775-1781.
Effect of manufacturing conditions on the grain size of aluminum sheet. Rolling technique for the production of fine-grained material, with good working properties, from various grades of aluminum. (Translated from *Revue de l'Aluminium.*)

19-310. Practical Problems of Light Presswork Production. (Continued.) J. A. Grainger. *Sheet Metal Industries,* v. 24, Sept. 1947, p. 1789-1795.
Adjustment of an internal draw sleeve; safety instructions for press toolsetters and operators; care of tools, instruction of operators, location of blanks in dies. (To be continued.)

19-311. Plastic Straining. K. L. Jackson. *Sheet Metal Industries,* v. 24, Sept. 1947, p 1795.
Application of plastic straining to the pressing of sheet metals.

19-312. Reconditioning Hot Mill Rolls. R. S. Trimble. *Iron Age,* v. 160, Sept. 18, 1947, p. 71-73; Sept. 25, 1947, p. 77-80.
Fundamentals of roll grinding; significance of various surface qualities and finishes; types of grinders available; selection of abrasive and bond; effect of changes of wheel speed on surface quality and finish. Grinding wheel feeds and speeds; wheel dressing and balancing; coolants; how to avoid inaccurate grinding and surface defects.

19-313. New Protective Film Cushions Dies and Protects Metal Surfaces in Pressing and Fabricating. *Modern Industrial Press,* v. 9, Sept. 1947, p. 6, 8, 20.
Use of plastic protective film for protection of dies and finished surfaces and the safeguarding of tools and parts in transit, assembly, and storage

19-314. Shop Shots at Kaiser-Frazer. *American Machinist,* v. 91, Sept. 25, 1947, p. 74-75.
Pressing and trimming of inner windshield frames.

19-315. Developments in Presses Promise Increased Production. *Machine and Tool Blue Book,* v. 43, Sept. 1947, p. 338-342, 344, 346, 348, 350-352.
Marked advances during the past few years in design of mechanical and hydraulic presses.

19-316. Modern Production Forging. F. L Stamm. *Western Machinery and Steel World,* v. 38, Sept. 1947, p. 108-111.
Procedures and equipment used by General Motors Corp., Los Angeles Forge Division, in its die and forge shop.

19-317. Tools for Upset Forging. R. H. Bell. *Western Machinery and Steel World,* v. 38, Sept. 1947, p. 118-122.
Procedures and equipment used in manufacture of bolts, nuts, rivets, at San Francisco Bethlehem plant.

19-318. A Mechanized Forge. *British Steelmaker,* v. 13, Sept. 1947, p. 461-468.
New British installation.

19-319. Vliv Moreni a Tvareni Plechu na Vymet Pri Lisovani. (Influence of Pickling and Rolling Procedure on the Waste in Rolling.) Bohuslav Otta. *Hutnické Listy,* v. 1, Oct. 1946, p. 73-77.
Results of a study of the effect of inclusions and of pickling and rolling procedure on the formation of cracks and on the amount of waste material produced during cold rolling.

19-320. The Plastic Flow of Aluminum Alloy Sheet Under Combined Loads. W T. Lankford and M. Gensamer. *Metals Technology,* v. 14, Aug. 1947, T.P. 2237, 31 p.
Several tests developed to permit the study of plastic flow and rupture of sheet metals under a wide variety

of combinations of the principal stresses. Stress-strain curves were determined for the aluminum sheet metals 24S-O and 24S-T up to large plastic strains under several methods of loading using both micro- and standard-size specimens. It is concluded that 24S-O and 24S-T conform approximately to an invariant stress-strain relationship in the plastic range. (Presented at Atlantic City Meeting of A.I.M.E., Nov. 1946.)

19-321. Some Problems in Unstable Plastic Flow Under Biaxial Tension. W. T. Lankford and Edward Saibel. *Metals Technology,* v. 14, Aug. 1947. T.P. 2238, 12 p.

Conditions leading to unstable plastic flow for several methods of loading; critical rates of strain hardening at which instability will occur. Completely analytical solutions for the limits of homogeneous strain for these loading methods are obtained for the first time. It is concluded that the limit of homogeneous deformation does not depend merely upon the state of stress, but also upon the method and geometry of loading. 12 ref. (Presented at Atlantic City Meeting of A.I.M.E., Nov. 1946.)

19-322. The Stainless Steels—Forging. Part II. Lester F. Spencer. *Steel Processing,* v. 33, Sept. 1947, p. 558-563, 584.

Methods for determination of corrosion resistance; miscellaneous applications; specifications for forging stock; and recommendations for forging procedures.

19-323. High Temperature Disk Forging Developments for Aircraft Gas Turbines. Part II. L. B. Fonda. *Steel Processing,* v. 33, Sept. 1947, p. 564-567.

Description of bursting investigation. The most important factors were found to be good ductility, good solution treatment, and use of the proper combination of inspection procedures (zyglo and supersonic).

19-324. Wings for Grooving Bars. *Sheet Metal Worker,* v. 38, Sept. 1947, p. 63.

Method and equipment for extending the basic width of grooving bars for finishing flat-seam air-conditioning ducts.

19-325. Quality Wire; Some Factors in Its Achievement. *Wire Industry,* v. 14, Sept. 1947, p. 497-501.

General suggestions for the plant manager.

19-326. A Twelve-End Wire Spooler. *Wire Industry,* v. 14, Sept. 1947, p. 505.

New British machinery.

19-327. Shot-Peening. Fred K. Landecker. *Western Metals,* v. 5, Sept. 1947, p 15-17.

Increased life of metal parts after shot treatment.

19-328. A Mechanized Forge. *Iron and Steel,* v. 20, Sept. 1947, p. 465-468.

New installation of British firm.

19-329. Precision Drop Forging of High Temperature Alloys. S. G. Demirjian. *Materials & Methods,* v. 26, Sept. 1947, p. 68-71.

How forgings provide superior properties to castings for high temperature alloys. Techniques in forging these alloys, atmosphere control and die steels.

19-330. Forging. Frank Charity. *Machine and Tool Blue Book,* v. 43, Oct. 1947, p. 146-148, 150, 152, 154.

Mechanical properties of typical aluminum-alloy forgings. Types of aluminum alloys suitable for forging and machining. Press equipment needed and some heat treating hints.

19-331. The Rubber Die Press as a Tool for Forming Aluminum. E. R. Yarham *Modern Machine Shop,* v. 20, Oct. 1947, p. 144-146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168.

British practice in the use of rubber press tools, as well as uses, operations which may be performed, equipment. (To be concluded.)

19-332. Effective Use of Rubber Forming Dies. Albert Schuneman. *Steel,* v 121, Oct. 6, 1947, p. 126, 156, 159.

Sequence of operations in production of 200 flange plate supports from 0.053-in. stainless steel. These dies are suitable where considerable accuracy and low cost are required or where low production does not justify the use of standard-type dies.

19-333. Pressing of L and U Profiles From Sheet. S. Geleji. *Muegyetemi Kozlemenyek,* no. 1, 1947, p. 14-24. (In English.)

A mathematical development of formulas for calculation of the force required.

19-334. The Effect of Mechanical Deformation on Grain Growth in Alpha Brass. J. E. Burke and Y. G. Shiau. *Metals Technology* v. 14, Sept. 1947, T.P. 2265, 14 p.

Results of an extensive study of the above effects includes a complete study of the microscopic behavior of alpha brass under conditions of temperature, time, grain size, and deformation such that recrystallization does not occur or occurs to only a small extent

19-335. The Comparative Properties of Several Types of Commercial Coppers, as Cold Worked and as Recrystallized. L. R. Jackson, A. M. Hall, and A. D. Schwope. *Metals Technology,* v. 14, Sept. 1947, T.P. 2274, 10 p.

Relations between the degree of cold work and the course of recrystallization. In particular, it is shown that

the course of recrystallization over long periods of time and at low temperatures can be predicted with reasonable accuracy from short-time high-temperature recrystallization data.

19-336. **Rolling Aluminum; Falkirk Plant of the British Aluminium Co., Ltd.** *Metal Industry,* v. 71, Sept. 26, 1947, p. 259-263.

New plant for rolling aluminum sheet. Description of melting shop, slab preparation, rolling plant, annealing furnaces, cutting-off machines, finishing department and inspection and packing.

19-337. **Nickel Alloy Extrusion. The Zenith Works of Henry Wiggin and Co., Ltd.** A. B. Graham. *Metal Industry,* v. 71, Sept. 26, 1947, p. 265-266.

Plant for hot extrusion and cold working of bars, sections, turbine blading and tubing in nickel alloys.

19-338. **Forging Aluminum and Magnesium on a Giant Hydraulic Press.** Ralph Moore and J. R. Douslin. *Machinery,* v. 54, Oct. 1947, p. 135-141.

Use of a hydraulic press of 18,000 tons capacity for production of 25,000 lbs. of aluminum or magnesium forgings per 8-hr. shift. Forging of an aluminum gas-turbine impeller and necessary modifications for magnesium forging.

19-339. **Hot and Cold Strip Mills; Important Advances Made in the Chicago Area.** E. D. Martin. *Metal Progress,* v. 52, Oct. 1947, p. 560-564.

Advances made by Inland Steel Co.'s metallurgists in cold mills and cold rolling include improvement of deep drawing quality of steel and strip and surface quality. Operation of 76-in. rolling mill.

19-340. **Die Steels and Their Treatments Pace Drop Forge Industry.** Alfred F Finkl. *Metal Progress,* v. 52, Oct. 1947, p. 581-584.

Developments of past 30 years. Development of better die steels—triple alloy—and better heat treatment based on knowledge of isothermal transformations and other metallurgical theories as well as better tools.

19-341. **Tungsten Carbide Rolls for Wire Flattening.** Edward C. Slick and Rexford E. White. *Iron Age,* v. 160, Oct. 9, 1947, p. 74-77.

The development of these rolls and the experience of Sylvania Electric Products Co., Inc., in rolling ribbons for the radio-tube industry on machines equipped with carbide rolls.

19-342. **How Diamonds Draw Ultra-Fine Wire.** Robert L. Zahour. *American Machinist,* v. 91, Oct. 9, 1947, p. 101-108.

Manufacture of the dies as well as drawing of the wire and its inspection.

19-343. **Production Processes—Their Influence on Design. Part 28: Rotary Impact Swaging.** Roger W. Bolz. *Machine Design,* v. 19, Oct. 1947, p. 101-106.

Power squeezing produces many desirable characteristics. Swaging methods with arrangement of dies, design of machine, support of tubing, and use of hot swaging for harder metals.

19-344. **Factors Affecting the Magnitude of Rolling Loads.** Eustace C. Larke. *Journal of the Birmingham Metallurgical Society,* v. 27, March 1947, p. 226-251; discussion, p. 252-257.

Various factors involved such as: effect of surface condition of deforming tools; effect of initial thickness; influence of roll diameter; resistance to homogeneous deformation; distribution of pressure on the roll face; and effect of coiler and decoiler tension.

19-345. **Use and Care of Diamond Dies.** *Industrial Diamond Review,* v. 7, Sept 1947, p. 274-275.

Abstracted from *Metal Cutting Data,* v. 2, May 1947, p. 5-7.

19-346. **Sheet and Tin-Plate Mills. (Concluded.)** J. H. Mort. *Iron and Steel,* v. 20, Sept. 1947, p. 431-435; Oct. 1947, p. 481-482, 496.

Calculation of roll-dressing formulas.

19-347. **Precision Thread Rolling.** W. A. Hawkins. *Machinery (London),* v. 71, Sept. 4, 1947, p. 261-263.

Principles, procedures, and applications.

19-348. **High-Production Die for Forming Fine Wires.** L. Segalle. *Machinery (London),* v. 71, Sept. 25, 1947, p. 347.

Described and diagrammed.

19-349. **High Viscosity Compounds Improve Stainless Plate Drawing.** *Iron Age,* v. 160, Oct. 16, 1947, p. 130.

Use of hydrogenated castor oil in a severe drawing operation on heavy-gage stainless steel for a railroad car-end stamping.

19-350. **Press-Shaping Bath Tubs.** *Steel,* v. 121, Oct. 20, 1947, p. 90-91.

Methods and equipment used for the above by Norris Stamping & Mfg. Co., Los Angeles.

19-351. **Forming Steel by Cold Extrusion.** *Steel,* v. 121, Oct. 20, 1947. p. 93. 128.

Research at Heintz Mfg. Co. on a German process has widened the range of extrudable steels and developed new aids to expedite and control it.

19-352. **Form Tools.** William F. Walker. *Edgar Allen News,* v. 26, Aug. 1947, p. 886-888.

Continues description of circular form tools. (To be continued.)

19-353. Shot-Peening Increases Life of Machinery Parts. R. B. Huyett. *Steel Processing,* v. 33, Sept. 1947, p. 553-557, 573.

The process and its quantitative life-increase effects on a series of automotive and aircraft parts. Use of the Almen gage to compare the intensities of peening operations; how cracked shot are removed in the air-wash separator. (To be continued.)

19-354. Shot-Peening Increases Life of Machinery Parts. Part II. (Concluded.) R. B. Huyett. *Steel Processing,* v. 33, Oct. 1947, p. 609-613, 638, 647.

Storage bins for automatic continuous replenishing of shot; design of centrifugal wheels for shot projection; machines for peening a variety of parts; use of the air blast; shot standards and quality; testing of shot.

19-355. Carbide Sheet Metal Dies. Earle Glen. *Steel Processing,* v. 33, Oct. 1947, p. 618-621.

Use of sintered carbides in progressive dies, draw dies, blanking dies, and punches. Design principles.

19-356. Extruding Aluminum Alloys. R. W. Graham. *Western Machinery and Steel World,* v. 38, Oct. 1947, p. 70-73, 100-101.

Production of standard extruded sections such as pipe, tubing, forging stock, channels.

19-357. Die-Grams. Karl L. Bues. *Western Machinery and Steel World,* v. 38, Oct. 1947, p. 108-109.

A compound forming die used in a secondary operation to form a part with two pairs of ears at right angles and in opposite directions to each other.

19-358. Magnesium Alloy Forgings. John Alico. *Light Metal Age,* v. 5, Oct. 1947, p. 14-17.

Properties; processes; cleaning and finishing procedures; present and potential applications. 11 ref.

19-359. Homestead's 160-In. Plate Mill. W. H. Gilleland and W. D. Hacker. *Iron and Steel Engineer,* v. 24, Oct. 1947, p. 35-43.

Refinements in plate mill design are reflected in better quality and accuracy in finished plate, as well as in increased production. (Presented before A.I.S.E. Pittsburgh District Section Meeting, Jan. 13, 1947.)

19-360. Modern Electrical Control for Wire Mill Machinery. O. M. Bundy. *Iron and Steel Engineer,* v. 24, Oct. 1947, p. 64-71.

Presented at A.I.S.E. Birmingham District Section Meeting, April 5, 1947.

19-361. Instrument Wire Manufacture. *Wire Industry,* v. 14, Oct. 1947, p. 560.

Information on several German plants. The products are said to be of mediocre quality.

19-362. The Rolling of Metals: Theory and Experiment—Part XV. Discussion of Certain Practical Rolling Problems in the Light of the Theory of Rolling. L. R. Underwood. *Sheet Metal Industries,* v. 24, Oct. 1947, p. 1984-1989.

The problems are considered under the following headings: rolling speed; roll diameter; strip tension; strip lubrication; and roll shape or camber. (To be continued.)

19-363. Hi-Carbon Wire Drawing. James H. Janssen. *Wire and Wire Products,* v. 22, Oct. 1947, p. 764-766.

Experimental results obtained indicate that cooled blocks along with heavier drafting definitely improve the physical properties of high-carbon wire, especially the larger sizes. (Presented at Wire Assoc. Convention, Chicago, Oct. 1947.)

19-364. The Fabrication of Tungsten Wire. Sidney Schein and Jack W. Forbes. *Wire and Wire Products,* v. 22, Oct. 1947, p. 767, 770-771, 836-838.

A description of processes. (Presented at Wire Assoc. Convention, Chicago, Oct. 1947.)

19-365. Improvements in the Wire Industry in the Last Ten Years. *Wire and Wire Products,* v. 22, Oct. 1947, p. 802-805, 808-812, 819-824.

Symposium: Brass-copper and bronze wire. Alloy and heat-resisting wires. Low and high carbon steel wire. Advances in the wire drawing field during the past ten years, by Earl Glen. Improvements in nonferrous practice, by Matthew J. Donachie. Advances in pickling, by Walter G. See. (Presented at Wire Assoc. Convention, Chicago, Oct. 1947.)

19-366. Nitrided Steel Hot Formed After Heat Treatment. Jack Frazier. *Materials & Methods,* v. 26, Oct. 1947, p. 80-83.

Experimental development of a satisfactory procedure for economically producing formed parts with high hardness values. The results obtained contradict several of the accepted ideas about processing a nitriding steel, and no theory has been developed to explain why these results were obtained. Sleeve valves for an internal-combustion engine were made of Nitralloy 125 by use of a combined forming and pressure-quenching operation. The sleeves showed less than 0.0005 in. wear after 1000 hr. of operation.

19-367. Forging Stainless Steel. *Materials & Methods,* v. 26, Oct. 1947, p. 125.

Forging range and compositions for 13 austenitic, 12 martensitic, and 3 ferritic stainless steels.

19-368. Bending Spar Booms. *Aircraft Production,* v. 9, Oct. 1947, p. 369.
Technique for handling tough alloy of heavy section.

19-369. Drawing Die Problems and Formulas. Part 6. The Techniques of Drawing. James Walker. *Tool Engineer,* v. 19, Oct. 1947, p. 29-35.
Triple and double-action presses; how to eliminate or minimize burrs, wrinkling, and buckling; design of pressure rings and pins, and bolster plates; mounting of punches and dies and calculation of press tonnages. (To be continued.)

19-370. The Effect of Speed of Rolling in the Cold-Rolling Process. H. Ford. *Blast Furnace and Steel Plant,* v. 35, Oct. 1947, p. 1219-1223.
Condensed from *Journal of the Iron and Steel Institute.* 17 ref. (To be continued.)

19-371. Form Tools. Part VI. Dovetail Form Tools. (Continued.) William F. Walker. *Edgar Allen News,* v. 26, Oct. 1947, p. 932-933.
To be continued.

19-372. Deep Drawing of Magnesium. R. G. Gillespie. *Machinery (London),* v. 71, Oct. 9, 1947, p. 395-403.
Procedures developed during the war.

19-373. The Use of Zinc Alloys for Blanking Dies. *Machinery (London),* v. 71, Oct. 9, 1947, p. 407-408.
Use by Bristol Aeroplane Co., Ltd. (Condensed from paper by J. W. Sladden and H. S. Walker.)

19-374. Drop Forging. *Metal Industry,* v. 71, Oct. 17, 1947, p. 323-324.
Several problems in the drop forging of light alloys. (Address to the Birmingham Metallurgical Society by F. E. Stokeld.)

19-375. Small Diameter Work Rolls Feature Montgomery Cold Strip Mill. From paper by W. M. McConnell. *Steel,* v. 121, Oct. 27, 1947, p. 88, 90.
Unique roll layout for 20-in. mill. Advantages are accurate gage control, more satisfactory rolling of thin strip along with heavier gages, greater over-all reductions, lower tension, higher deformation efficiency, reduced forward slip and spread, and lower roll pressures. The mill is said to be applicable to high and low-carbon and stainless steel for cold reduction and temper rolling. (Presented at Annual Meeting of A.I.S.E., Pittsburgh, Sept. 22-25, 1947.)

19-376. The Rubber Die Press as a Tool for Forming Aluminum. Part II. E. R. Yarham. *Modern Machine Shop,* v. 20, Nov. 1947, p. 154-156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182.
Methods of blanking, shearing, flanging, and forming; flanging and flanging tools; bearer blocks; drawing.

19-377. Cold Extrusion of Steel Now Being Investigated for Automotive Use. Robert C. Mack. *Automotive Industries,* v. 97, Nov. 1, 1947, p. 40-41, 68.
German-developed process being investigated by Heintz Mfg. Co., Philadelphia.

19-378. Progressive Die Produces Safety Runway. J. A. King. *American Machinist,* v. 91, Nov. 6, 1947, p. 128-132.
How perforating and embossing die is arranged with mechanical stock feed and several gage bars to control punch action, in production of steel plate for catwalks and platforms, with safety treads.

19-379. The Shaping of Die Forged Parts. *Product Engineering,* v. 18, Nov. 1947, p. 130-134.
A number of practical shaping procedures followed by German industry. The splitting process; forging of hollow parts; simplification of forging procedures by use of cutting and welding; new methods for accurate forming. (Condensed from "Die Gestaltung von Gesenkschmiedstucken" by Hans Maller, *V.D.I. Zeitschrift,* Dec. 25, 1943, p. 809.)

19-380. Adjustable and Demountable Punches and Dies. *Tool & Die Journal,* v. 13, Nov. 1947, p. 82, 86, 88, 92.
Examples made by several different companies.

19-381. Production Processes—Their Influence on Design. Part XXIX—Roll Die Forging. Roger W. Bolz. *Machine Design,* v. 19, Nov. 1947, p. 129-134.
Equipment; methods; applications; design; materials; tolerances.

19-382. Roll Deflection. A. B. Cox. *Machine Design,* v. 19, Nov. 1947, p. 147-150.
Formulas permit calculation of deflection due to bending and shear at any point along a roll. Maximum deflection calculations are simplified by the use of a chart and by reduction to a "mill constant" which is the ratio of maximum deflection to load.

19-383. Shot-Peening Aluminum Forgings. Charles H. Wick. *Machinery,* v. 54, Nov. 1947, p. 133-139.
A relatively new application of shot-peening adopted by Pratt & Whitney Aircraft Div. for strengthening aluminum alloy pistons and crankcase sections.

19-384. Hydrodynamic Method of Drawing and Embossing. *Machinery,* v. 54, Nov. 1947, p. 159-161.
Method of drawing or embossing difficult shapes in one operation is particularly adaptable to the forming of

shallow shapes and the drawing of cone-shaped and tapered stampings, but not for the forming or drawing of straight-walled stampings, which can be handled more economically by usual methods on mechanical presses.

19-385. Erfahrungen in der Ausgestaltung von Ziehwagen und Zubehor fur den Mehrstangenzug. (Construction of a Draw Carriage and Accessories for the Simultaneous Drawing of Several Rods.) Karl Wallmann. *Stahl und Eisen,* v. 66-67, April 24, 1947, p. 149-153.

New type of draw carriage for simultaneous drawing of several rods. An increase in production of 80 to 90% in comparison with formerly used equipment.

19-386. Der Derzeitige Stand der Erkenntnisse Ueber Die Mechanischen Vorgange Beim Drahtziehen. (Modern Conception of Mechanical Processes Taking Place During Wire Drawing.) Erich Siebel. *Stahl und Eisen,* v. 66-67, May 22, 1947, p. 171-179.

How to calculate the energy required for deformation, the amount of energy which should be applied for best results, and the stress distribution during drawing. 58 ref.

19-387. Numerische Berechnung der Spannungsverfestigung Beim Kaltrecken und Kaltstauchen. (Numerical Calculation of Improvement of Tensile Strength During Cold Drawing and Cold Working.) H. Brandenberger. *Schweizer Archiv,* v. 13, Aug. 1947, p. 232-238.

Equations and diagrams for calculation of strength properties of notched and plain bars which have been cold drawn or cold worked. The improvement in notched bars is attributed to nonuniform, transverse distribution of stresses. Such improvements are also possible in plain bars in bending or tensile tests. (To be continued.)

19-388. Urceni Razove Prace Zapustkoveho Bucharu. (Determination of Impact Force of Forging Hammers.) Frantisek Drastik. *Hutnické Listy,* v. 2, Sept. 1947, p. 57-61.

Empirical formulas for approximate determination of the impact force of forging hammers for carbon steel and for structural alloy steel, based on number of strokes and projected surface on the joint plane. Size of hammer required for a specific job can be determined from these figures.

19-389. Modern Small Rolling Mills. G. A. Phipps. *Journal of the Iron and Steel Institute,* v. 157, Oct. 1947, p. 247-261.

The layout of a number of different mills of American design and possibilities for future development in Britain.

19-390. Mechanical and Electrical Features of Primary Hot Rolling Mill Auxiliaries. W. W. Franklin and P. F. Grove. *Journal of the Iron and Steel Institute,* v. 157, Oct. 1947, p. 262-278.

Roller tables, bearings, rollers, manipulators, tilting fingers, screwdown gears, bloom shears, mill-type motors. Rating and duty of electric drives for roller tables, breast rollers, manipulators, screwdown and heavy shears, cabling, lighting.

19-391. The Stainless Steels—Fabrication and Heat Treatment After Cold Working. Part III. Lester F. Spencer. *Steel Processing,* v. 33, Oct. 1947, p. 621-629.

Properties of the various types; selection of proper surface finish preliminary to deep drawing or spinning; drawing and spinning equipment and procedures; lubricants; and annealing pretreatments. (To be continued.)

19-392. Light Alloy Rolling. *Metal Industry,* v. 71, Oct. 31, 1947, p. 369.

Abstract of recent B.I.O.S. report on German methods and equipment.

19-393. Hydraulic Forming of Stainless Steel. William C. Brice. *Materials & Methods,* v. 26, Nov. 1947, p. 68-70.

How the problem of necking-in the top of a stainless-steel pail was solved by application of hydraulic pressure to force the metal into the desired shape, using the female die as a sealing unit.

19-394. Shot-Peening of Nonferrous Metals. Harold A. Knight. *Materials & Methods,* v. 26, Nov. 1947, p. 83-86.

Results of experiments which show that above treatment increases stress corrosion of some nonferrous metals such as brass, aluminum, and magnesium, in some cases increasing the life up to 40 times.

19-395. The Massena Works of Aluminum Company of America. *Wire and Wire Products,* v. 22, Nov. 1947, p. 891-894.

Equipment and procedures of plant, especially for aluminum wire drawing.

19-396. The Rolling of Metals: Theory and Experiment. Part XV. (Continued.) L. R. Underwood. *Sheet Metal Industries,* v. 24, Nov. 1947, p. 2199-2205.

Calculation of roll diameters based on effects of various factors; and effects of strip tension on roll load, power requirements, flatness and shape of strip, and gage. (To be cont.)

19-397. Considerations Involved in the Accurate Development of Templets. (Concluded.) A. Dickason. *Sheet Metal Industries,* v. 24, Nov. 1947, p. 2233-2234, 2244.

Complete design calculations and diagrams for development of a templet or blank for the lid of a small rectangular box with rounded corners to be pressed from one piece.

19-398. The Techniques of Drawing. Installment No. VII. James Walker. *Tool Engineer,* v. 19, Nov. 1947, p. 33-41.
Design of dies involving simple and compound operations. Calculation of reduction and of punch and die sizes; selection of aluminum alloys for specific jobs; redrawing; reverse drawing; a two-stage draw die; use of auxiliary holding pressures; and pinch trimming.

19-399. How to Feed Presses. *American Machinist,* v. 91, Nov. 20, 1947, p. 85-100.
Automatic and semi-automatic devices that can be applied to power presses for metal-stamping operations. General construction of feeding mechanisms as well as their limitations and possible production rates.

19-400. Modern Forging Practice. *Journal of the Birmingham Metallurgical Society,* v. 27, Sept. 1947, p. 378-390.
Report of a meeting of the Midland Metallurgical Societies, Birmingham, March 27, 1947. General talk by F. E. Stokeld. Drop forging manufacture, by K. Fidler.

19-401. New Press From Santa Monica. *Western Machinery and Steel World,* v. 38, Nov. 1947, p. 92-94.
Production of 30-ton shear-and-press combination called Multi-Max by Parker Mfg. Co.

19-402. The Production of Forgings for Radial and Jet Aircraft Engines at Canton Drop Forging Plant. Part 1: Production of Radial-Engine Cylinders. (To be continued.) *Industrial Heating,* v. 14, Nov. 1947, p. 1800-1804, 1806, 1808, 1810, 1933.

19-403. The Effect of Speed of Rolling in the Cold-Rolling Process. Part II. (Concluded.) H. Ford. *Blast Furnace and Steel Plant,* v. 35, Nov. 1947, p. 1368-1371.
Condensed from *Journal of the Iron and Steel Institute.* 17 references.

19-404. The Cold Extrusion of Steel. *Enamelist,* v. 24, Nov. 1947, p. 28-31.
Application and improvement of above process, originally developed by the Germans. (Condensed from *Business Week,* Aug. 9, 1947.)

19-405. Steel Wire. *Iron and Steel,* v. 20, Nov. 1947, p. 527.
Use of borax in the dry-drawing process. (Based on Technical Service Bulletin No. 9, Borax Consolidated, Ltd.)

19-406. Crankshaft Twisting. *Iron and Steel,* v. 20, Nov. 1947, p. 537-540.
Apparatus in use in Germany for twisting of large crankshafts as part of the forging operation. From B.I.O.S. Report No. 1329.

19-407. Unique Gathering in Forming. *Western Machinery and Steel World,* v. 38, Nov. 1947, p. 72-73.
Fabrication of special aluminum "board" used in payroll and other accounting work. The feature emphasized is the drawing of three longitudinal slots, by means of a three-draw operation, close to the edges of the board.

19-408. Trimming Presses Make Foundry Production Soar. P. D. Aird. *Modern Industrial "Press",* v. 9, Nov. 1947, p. 13-14, 18, 34.
Use in production of automotive castings at River Rouge Plant of Ford Motor Co.

19-409. Designing of Trouble-Free Dies. Part LXXV. Modern Engineering Trends in Presswork. C. W. Hinman. *Modern Industrial "Press",* v. 9, Nov. 1947, p. 20.
Improvements in multislide machines; circular dials and multipresses; modern trends in forging-press design.

19-410. Funeral Cars Require Exacting Presswork. Walter Rudolph. *Modern Industrial "Press",* v. 9, Nov. 1947, p. 22, 24, 26, 36.
Use of short-life dies and highly skilled finishing methods, particularly for body-panel work, in production of buses ambulances, and funeral cars.

19-411. Rolling and Forming of Metal. H. Maurice Banta. *Metals Review,* v. 20, Nov. 1947, p. 5-7, 55.
Developments during the past year as described in the literature.

19-412. Equipment and Processes for Rolling, Forging and Presswork. *Metals Review,* v. 20, Nov. 1947, p. 8-9, 11, 13, 15, 17, 53.
New commercial methods and products for high-speed metal fabrication. Based on manufacturers' literature. Includes names and addresses of manufacturers.

19-413. Electrical Equipment for the Sendzimir Cold Strip Mill. H. W. Poole. *Iron and Steel Engineer,* v. 24, Nov. 1947, p. 42-49; discussion, p. 49-51.
Presented before A.I.S.E. Annual Convention, Cleveland, Oct. 3, 1946.

19-414. Maintenance Kink: Roll Grooving. *Iron and Steel Engineer,* v. 24, Nov. 1947, p. 92.
Machine for rotating 40-in. blooming-mill rolls on a planer for grooving or "ragging". The tool eliminates use of an overhead electric crane to turn or rotate the roll on the planer bed; eliminates chatter when cutting grooves, resulting in smoother cut grooves; and reduces the time per roll to about 1 hr., 15 min., a saving of 75% over the old method.

19-415. New Silicon Strip Cold Mill. F. R. Grant. *Iron Age,* v. 160, Nov. 20, 1947, p. 79-83.

Four-stand tandem mill recently installed at West Leechburg plant of Allegheny Ludlum Steel Corp., and its auxiliary equipment.

19-416. Forging Tolerances. *Steel,* v. 121, Nov. 24, 1947, p. 107.

Determining commercial tolerances for closed impression die forgings is greatly simplified by a chart that helps user to determine almost instantly tolerances for any style, shape, and weight of forging up to 500 lb.

19-417. Semiproduction Runs of Experimental Stampings. *Iron Age,* v. 160, Nov. 27, 1947, p. 78-79.

Experimental production department utilizes temporary tooling and some 220 small kick presses, for production of small stampings.

19-418. Advanced Type Equipment Conspicuous in Willys Press Shop. *Automotive Industries,* v. 97, Dec. 1, 1947, p. 44, 84, 86.

19-419. Homemade Presses Build Vanette Truck Bodies. Chester Ricker. *American Machinist,* v. 91, Dec. 4, 1947, p. 89-92

Ingenious methods and equipment used to convert surplus aircraft channels into delivery-truck bodies.

19-420. Forming Thin-Metal Cylinders. Wallace C. Mills. *American Machinist,* v. 91, Dec. 4, 1947, p. 96-103.

Designs for economical and efficient production of small cylinders with open or lock seams.

19-421. Frozen Dies Form Experimental Parts. Chester S. Ricker. *American Machinist,* v. 91, Dec. 4, 1947, p. 110-111.

Tripling the strength of Wood's metal dies by freezing in liquid nitrogen makes them suitable for forming thin sheet metal parts.

19-422. Calculation of Loads Involved in Metal Strip Rolling. Maurice Cook and Eustace C. Larke. *Journal of the Institute of Metals,* v. 74, Oct. 1947, p. 55-80.

Method for computing rolling loads dispenses with the need for individual determination of the influence of numerous factors, including roll-face distortion. The derivation is based on the assumption that the magnitude of the pure work of rolling is independent of the number of passes used in effecting a given reduction in thickness. The basic experimental data required consist only of a few measured values of rolling loads developed in rolling one material under a series of sets of rolling conditions. From these data, rolling loads can be readily computed for any number of passes. Comparisons with experimental values for steel and copper show good agreement.

19-423. The Effect of Single and Multi-Hole Die Extrusion on the Properties of Extruded Aluminum Alloy Bar. L. Northcott, D. McLean, and O. R. J. Lee. *Journal of the Institute of Metals,* v. 74, Oct. 1947, p. 81-93.

Longitudinal streaks on the surface of aluminum alloy components machined from extruded bar in two alloys were found to be associated with erratic circumferential strength. The streaks are caused by the flow structure originating in extrusion through multi-hole die plates. The "radial flow" structure was absent from bars extruded through single-hole die plates. Segregation was found near the periphery in the zone of radial flow. Provision of a central hole in three and four-hole die plates confined the segregate to the axis of the central bar.

19-424. Forging Die Design—Swaging. John Mueller. *Steel Processing,* v. 33, Nov. 1947, p. 673-676.

Principles and applications of this process to different types of jobs.

19-425. Stretching Characteristics of Aluminum Alloy Sheet. J. M. Taub. *Light Metal Age,* v. 5, Nov. 1947, p. 6-13.

From A.S.M. Preprint No. 12, 1947 (see item 19-273).

19-426. Carbide Sheet Metal Dies. Earle Glen. *Machine and Tool Blue Book,* v. 43, Dec. 1947, p. 133-138, 140.

Some of the principles underlying the design of carbide dies, particularly punches.

19-427. Spinning and Panel-Beating of Aluminum Alloys. Part I. E. R. Yarham. *Modern Machine Shop,* v. 20, Dec. 1947, p. 124-128, 130, 132.

Some of the principles upon which British methods of fabrication of aluminum alloys are based. (To be continued.)

19-428. Drop Forging of Turbine Blades Eliminates Machining Operation. Carl I. Schweizer. *Aviation Week,* v. 47, Dec. 8, 1947, p. 37-38.

Precision process which gives metallurgically superior product with better mechanical properties and close tolerances. Design differences; differences in material; and tooling differences, as well as handling and processing procedures.

19-429. Huge Presses at Work for Kaiser-Frazer. *Automotive Industries,* v. 97, Dec. 15, 1947, p. 30-31.

A picture story.

19-430. Improved Design for Rail and Structural Mills. H. F. Voigt. *Iron and Steel Engineer,* v. 24, Dec. 1947, p. 55-69; discussion, p. 69.

A combined rail and structural rolling mill built for a steel plant in Europe.

19-431. The Production of Forgings for Radial and Jet Aircraft Engines at Canton Drop Forging Plant. Part II. *Industrial Heating,* v. 14, Dec. 1947, p. 1972-1974, 1976, 1978, 1980, 2076.

19-432. Recent Advancement in the Shaping and Forming of Steel. *Industrial Heating,* v. 14, Dec. 1947, p. 2014, 2016, 2018.

Summarizes six papers presented at special panel of A.I.S.I. in connection with recent annual meeting in New York.

19-433. The Rolling of Metals: Theory and Experiment. Part XV—Discussion of Certain Practical Rolling Problems in the Light of the Theory of Rolling. (Continued.) L. R. Underwood. *Sheet Metal Industries,* v. 24, Dec. 1947, p. 2405-2409.

Effect of strip tension on spread; optimum value of strip tension; methods of applying and controlling strip tension; effects of strip lubrication on various factors. (To be continued.)

19-434. Improved Production in Drawing With Tungsten Carbide Dies. *Sheet Metal Industries,* v. 24, Dec. 1947, p. 2425-2426.

Several applications.

19-435. Production Processes. Their Influence on Design. Part XXX—Wire and Ribbon Forming. Roger W. Bolz. *Machine Design,* v. 19, Dec. 1947, p. 141-146.

Many components and item~ made by above process.

19-436. Steels and Lubricants for High Production Dies. James Walker. *Tool Engineer,* v. 19, Dec. 1947, p. 29-35.

Graphite steels; Bethlehem "Lehigh H" steel; meehanite; Ampco bronze for draw-die components; bulging dies; chromium plating of dies; Cromovan, a high-carbon, high-chromium toolsteel; nitriding; graphite nitralloy; carbide dies; lubrication of dies; viscosity and boundary lubrication; drawing compounds.

19-437. Die-Grams. Karl L. Bues. *Western Machinery and Steel World,* v. 38, Dec. 1947, p. 109-110.

Production by drawing of dome-shaped name plate, made of 0.025-in brass and electro-etched with company name and other information.

19-438. Design Innovations in Punches and Ejectors. Federico Strasser. *Tool & Die Journal,* v. 13, Dec. 1947, p. 62-64.

19-439. Which Should You Specify—Drawing or Forming Dies? Charles R. Cory. *Machinery,* v. 54, Dec. 1947, p. 176-182.

Answer depends upon the part. Proper dies for each of several types of parts.

19-440. Heater Manufacture at Evans Products Co. Puts New Demands on Flexibility of Presses. P. D. Aird. *Modern Industrial "Press",* v. 9, Dec. 1947, p. 13-14, 18, 20, 54.

Procedures and equipment in above plant.

19-441. Simplified Production of Steel Shelving Primarily Involves Efficient Presswork. Walter Rudolph. *Modern Industrial "Press",* v. 9, Dec. 1947, p. 24, 26, 28.

19-442. Knapp-Monarch Uses a Variety of Presses to Form Electrical Appliances. Gerald E. Stedman. *Modern Industrial "Press",* v. 9, Dec. 1947, p. 36, 38, 40, 42.

19-443. Hobbed Cavities for Metals and Plastics. Thomas A. Dickinson. *Modern Industrial "Press",* v. 9, Dec. 1947, p. 46, 48.

Use of hobbing technique to produce molds for plastics and metals. The cavity or its parts are produced by means of hydraulic pressing of hardened toolsteel patterns into relatively soft steel blanks.

19-444. Rocket-Jet Aircraft. S. Adams. *Modern Industrial "Press",* v. 9, Dec. 1947, p. 50, 52.

Use of press forming in fabrication of the above.

19-445. Selection of Stripper Springs. J. R. Paquin. *American Machinist,* v. 91, Dec. 4, 1947, p. 153.

Rules and calculation methods for selection and application of springs for stripper plates in modern high-speed dies.

19-446. Stampings for Welded Fabrication Cut Costs and Increase Production. Charles G. Herbruck. *Iron Age,* v. 160, Dec. 11, 1947, p. 102-104.

Addition of a 500-ton hydraulic press to its mechanical press department has enabled Lincoln Electric Co. to eliminate certain machining operations, casting and forging purchases, and subcontracting. Use of this press to perform a variety of operations.

19-447. A Simple Method of Forming Sheet Metal. *Iron Age,* v. 160, Dec. 18, 1947, p. 71.

Use of a hand-operated air hammer, a press, and wooden molds to draw sheet metal into various designs.

19-448. Fabricating Steel Hardware. *Steel,* v. 121, Dec. 22, 1947, p. 71-72, 86, 88.

A variety of hot and cold working methods used in manufacturing industrial fasteners and hardware.

19-449. Fabricating Rolled Steel Draft Gears for Railroad Cars. E. F. Ross. *Steel,* v. 121, Dec. 29, 1947, p. 46-48.

Forging and welding techniques followed by A. O. Smith Corp. to turn out couplings engineered to withstand repeated severe impacts.

19-450. Influence de l'Ecrouissage Provoqué par le Travail Mecanique à Froid sur l'Aptitude à l'Oxydation du Fer. (Effect of Cold Hardening Induced by Cold Working on the Oxidizability of Iron.) Jacques Benard and Odile Coquelle. *Revue de Metallurgie,* v. 44, March-April 1947, p. 82-86.

Tests on iron surfaces indicated that the oxidizing properties of the iron varied with the nature of the treatment. For surface cold hardening due to abrasives, the rate of oxidation varies inversely with the size of the abrasive. In cold hardening due to lamination the rate of oxidation increases in proportion to the reduction of the cross section, and in cold hardening by drawing the rate increases at first, but decreases as rupture approaches.

19-451. Numerische Berechnung der Spannungsverfestigung Beim Kaltrecken und Kaltstauchen. (Numerical Calculation of Improvement in Tensile Strength During Cold Drawing and Cold Working.) (Concluded.) H. Brandenberger. *Schweizer Archiv,* v. 13, Sept. 1947, p. 268-275.

Calculation of stress relationships developed during the flow process.

19-452. Stanoveni Vhodnych Podminek pro Válcování Za Tepla Hlinikove Slitiny Typu Al-Mg-Si. (The Determination of Advantageous Conditions for the Hot Rolling of Aluminum Alloys Containing Mg and Si.) Karel Holes. *Hutnicke Listy,* v. 2, Oct. 1947, p. 77-80.

Results of an experimental investigation of the above which show that it is necessary to heat the sheet billets designed for hot rolling to a temperature of 540° C. to avoid formation of cracks during hot rolling and to produce sheets capable of deep drawing at an annealing temperature of 400° C.

19-453. Brabazon Bearing Brackets. *Aircraft Production,* v. 9, Dec. 1947, p. 457-458.

Small-scale manufacture of large aluminum forgings for the prototype Bristol 167 aircraft.

19-454. Metal Bellows. *Electronic Engineering,* v. 19, Dec. 1947, p. 397.

A method of forming bellows hydraulically in one piece. A thin tube of brass, bronze, or special alloy, from 0.004 to 0.007 in. thick, is inserted in a collapsible die and liquid at several hundred psi. is forced into the tube. Under this pressure, any imperfection in the metal will appear immediately.

19-455. Stretching Characteristics of Aluminum Alloy Sheet. J. M. Taub. *Transactions of American Society for Metals,* v. 40, 1948, p. 180-207; discussion, p. 207-208.

See item 19-273.

19-456. Recrystallization as a Measurement of Relative Shot-Peening Intensities. K. B. Valentine. *Transactions of American Society for Metals,* v. 40, 1948, p. 420-427; discussion, p. 427-434.

See item 19-274.

19-457. Elimination of Shatter Cracks by Hot Working. E. L. Koehler and H. B. Wishart. *Transactions of American Society for Metals,* v. 40, 1948, p. 513-528.

Forging and rolling tests indicate that shatter cracks can be welded together by hot working, more effectively by forging than by rolling. Orientation of the cracks influences the amount of hot working required and may make elimination of cracks impossible.

19-458. Pole Figures of the Effect of Some Cold Rolling Mill Variables on Low-Carbon Steel. John Karl Wood, Jr. *Transactions of American Society for Metals,* v. 39, 1947, p. 725-736; discussion, p. 736-740.

Previously annotated in R.M.L., v. 3, 1946, item 19-276.

19-459. Evaluation of the Forming Properties in Bending of Five Commercial Sheet Aluminum Alloys. G. R. Gohn and S. M. Arnold. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 1053-1061; discussion, p. 1062-1063.

Two methods of test developed for evaluating the forming characteristics in bending of sheet and strip metals, one by means of a punch and die setup, the other by means of a bending brake. Minimum safe forming radii for forming 90° bends in five commercial aluminum alloys in sheet form, varying in thickness from 0.012 to 0.128 in. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

19-460. Relative Triaxial Deformation Rates. William M. Baldwin, Jr., T. S. Howald, and A. W. Ross. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 86-109; discussion, p. 109-113.

Previously appeared in *Metals Technology,* Sept. 1945, T.P. 1808. 29 ref.

19-461. The Extrusion Process. W. W. Cotter and W. R. Clark. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 447-457; discussion, p. 466-472.

Previously appeared in *Metals Technology,* Sept. 1945, T.P. 1850.

19-462. Some Factors Affecting the Rate of Extrusion of Aluminum Alloys. T. L. Fritzlen. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 458-465; discussion, p. 466-472.

Previously annotated from *Metals Technology,* Oct. 1945, T.P. 1851, in R.M.L., v. 2, 1945.

19-463. Effect of Rolling and Annealing Upon the Crystallography, Metallography, and Physical Properties of Copper Strip. William M. Baldwin. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 591-611.

Previously appeared in *Metals Technology,* April 1942, T.P. 1455. Withheld from 1942 volume by Office of Scientific Research and Development.

SECTION XX

MACHINING AND MACHINE TOOLS

20-1. Machine and Tool Engineering. *Production Engineering & Management,* v. 18, Dec. 1946, p. 58-59.

"Combination Tool Solves Turret Lathe Problems" by R. E. Cameron; "Inverted Drilling Method Includes Chip Removal" by Robert Mawson; "Nibbling Machine Cuts Tubes to Irregular Contours" by Alexander Coulter.

20-2. New Cutting Speeds for Brass Offset Higher Material Costs. Russell A. LaCombe. *Production Engineering & Management,* v. 18, Dec. 1946, p. 60-61.

New standards of operation have resulted from the successful application of feeds and speeds far in excess of those ordinarily employed for production machining of brass.

20-3. The Removal of Metals by Grinding. R. E. McKee, R. S. Moore, and O. W. Boston. *Society of Automotive Engineers Preprint,* 1946, 11 p.

Results of an investigation to determine the influence of grinding wheels, grinding compounds, and other pertinent factors that may affect the process of cylindrical grinding. Machine used was a Cincinnati No. 2 cylindrical grinder with a 10-in. swing and 36 in. between centers. S.A.E. 52100 steel, a product of an electric furnace, was used. Measuring equipment used during the tests.

20-4. High-Speed and Superspeed Cutting of Metals. I. M. Besprozvany, A. N. Danielian, A. V. Pankin, and N. I. Reznikov. *Engineers' Digest,* v. 3, Nov. 1946, p. 565-567.

Various attempts to utilize "superspeed" in metal cutting and machining operations and the difficulties encountered. Authors conclude that speeds of several thousand feet per min. are not practicable, except for aluminum. However, a threefold increase in speed is theoretically justified by the high-speed alloys. Twenty practical details of superspeed end and face milling of steel. New machines with triple present horsepower, greatly increased strength and rigidity, precise balancing, and a flywheel should be designed for superspeed milling. (Condensed from *Vestnik Inzhenerov i Tehnikov,* no. 2, 1946, p. 65-73.)

20-5. Behind the Steel Curtain. Ralph M. Smith. *American Machinist,* v. 91. Jan. 2, 1947, p. 73.

An effective and satisfactory guard, developed for use in Carboloy Co.'s machine shops, consists of a large ring from which are suspended overlapping lengths of steel sash chain. This guard is particularly adapted for use on vertical milling machines. Various design modifications in location of mounting brackets and adjustability of guard position have been made to permit its use with vertical millers of different makes, types and sizes.

20-6. Interchangeability of Large Machine Parts. N. N. Sawin. *American Machinist,* v. 91, Jan. 2, 1947, p. 88-91.

Results of foreign research on diameters from 500 to 3,000 mm.

20-7. Blind Holes Splined With Short-Section Broaches. Harry H. Gotberg. *American Machinist,* v. 91, Jan. 2, 1947, p. 99.

Design of broach for a specific problem.

20-8. Practical Ideas. *American Machinist,* v. 91, Jan. 2, 1947, p. 101-108.

Direct-reading straightedge tester uses three toolmakers' buttons. Tighter grip improves pivoted joints. Serrated cam clamps light castings in multiple drill jig. Electric stops indicate proper depth of cut. Make grinding goggles impossible to ignore. How to position a slotting cutter. Torsional V-gage. Stepped cylinder. V-block adapter. Pendulum gage. Hooded surface grinders remove abrasive dust. How to utilize broken taper-shank drills. Pillar files knurl stainless steel rods. Diehead improvements solve small-thread problems. Screw feed improves grooving and boring head. Air blast removes paper from steel strip roll. Die square.

20-9. Boring Machine With Planer-Type Table. *Engineering,* v. 162, Nov. 29, 1946, p. 511-512, 516.
Description of boring mill, special applications, operation.

20-10. The Machining of Stainless Steels. W. H. Crisp. *Engineering,* v. 162, Nov. 29, 1946, p. 526-528.
Recommendations for the production of holes and threads.

20-11. The Broaching of Brasses and Bronzes. Part II. Harry H. Gotberg. *Tool & Die Journal,* v. 12, Dec. 1946, p. 85-88, 100, 102.
Handling of broaches; broaching machines; machine setup; fixtures; machine operation; broach sharpening.

20-12. Safe Feeds and Speeds for High Speed Drills. *Tool & Die Journal,* v. 12, Dec. 1946, p. 119.
Speeds and feeds applying to average working conditions of cast iron; bronze or brass; drop forgings of alloy toolsteel, annealed; drop forgings of alloy steel, heat treated; steel castings; mild steel.

20-13. Broaching Machines, Tools and Practice. (Concluded.) E. Percy Edwards. *Engineering,* v. 162, Dec. 6, 1946, p. 534-535.
Construction of broaching machines; types and forms of broaches; design of broach bars; materials for broaches; coolants; sharpening; fixture design.

20-14. Groove and Slot Grinding. *Industrial Diamond Review,* v. 6, Dec. 1946, p. 362.
Information concerning the above operations. (Abstracted from *Grits & Grinds,* v. 36, no. 6, 1945, p. 8-10.)

20-15. Economic Use of Diamond Abrasive Sawing Disks. *Industrial Diamond Review,* v. 6, Dec. 1946, p. 366.
Information is tabulated.

20-16. Diamond Wheel Dressing on the New Gleason Hypoid Grinder. *Industrial Diamond Review,* v. 6, Dec. 1946, p. 371-372.
New automatic machine for grinding spiral, hypoid and Zerol bevel gears by the generating method.

20-17. Limitation of Sintered Carbide. R. B. Sheffer. *Industrial Diamond Review,* v. 6, Dec. 1946, p. 372.
Author debunks "misconceptions" concerning nonapplicability of sintered carbide tools for certain uses.

20-18. Centerless Taper Grinding by Swivelling Regulating Wheel. *Industrial Diamond Review,* v. 6, Dec. 1946, p. 379.
Improved method is described.

20-19. Grinding Machine for Table-Knife Shoulders. *Engineering,* v. 162, Dec. 13, 1946, p. 561.
British machine manufactured by Messrs. A. A. Jones and Shipman, Ltd., is applicable to single specific purpose.

20-20. Precision Finishing of Bores. E. R. Yarham. *Modern Machine Shop,* v. 19, Jan. 1947, p. 124-130.
British methods of boring and honing holes in aircraft components where a high finish and close limits on size are specified.

20-21. Necessities of War Increase Production for Peace. E. A. Zaczek. *Modern Machine Shop,* v. 19, Jan. 1947, p. 146-148, 150, 154, 156, 158, 160, 162, 164, 166, 168, 170.
Machine tools that did the work of as many as three former pieces of equipment and which in two cases increased the output 400% were developed and coordinated into a production system specifically designed to meet rigid delivery schedules. New machines are chiefly in the fields of milling, drilling, and tapping operations. Each tool fully described, showing how it increases production.

20-22. Ideas From Readers. *Modern Machine Shop,* v. 19, Jan. 1947, p. 202-204, 206, 208, 210, 212, 214, 216, 218.
A simple but useful sine bar. Automatic milling fixture. Adjustable facing cutter. Vise attachment which facilitates templet filing.

20-23. Centerless Grinding Operations on Fountain Pen Components. *Machinery (London),* v. 69, Dec. 12, 1946, p. 754-755.
Process used for grinding barrels, caps, and pen sections. Limitations of the process.

20-24. Toolmaking Methods. *Machinery (London),* v. 69, Dec. 12, 1946, p. 747-753.
Typical problems encountered in high precision work and their practical solution, with particular reference to concentricity and thread gages.

20-25. Special Techniques for Precision-Made Products. *Western Machinery and Steel World,* v. 37, Dec. 1946, p. 94-100.
Plant and equipment and operations for the production of the Kirsten "radiator" pipe and the Kirsten cigarette holder. Begins with working with the base metal—duralumin—in the form of extruded bars.

20-26. Pumps Are Machined Products. R. G. Paul. *Western Machinery and Steel World,* v. 37, Dec. 1946, p. 102-105.
Essential parts of this pump for the petroleum industry are fabricated from gray iron castings. These are the pump housing, the cover, the three elements of the rotor, the stub cap, the stuffing box and the relief valve housing. Machining and assembly operations.

20-27. Tool Life and the Selection of Carbide. Raymond O. Catland. *West-*

ern Machinery and Steel World, v. 37, Dec. 1947, p. 108-111.

Design of milling cutters. (To be continued.)

20-28. Precision Machining of Wrought Aluminum Alloys. Gilbert C. Close. *Light Metal Age*, v. 4, Dec. 1946, p. 18-22.

The metallurgical characteristics of the wrought alloys which have a bearing on machinability. Specific recommendations for milling, drilling, reaming, threading and tapping, sawing, and filing.

20-29. Unique Tooling Used to Mass Produce Special Parts at G. M. C. Saginaw Steering Plants. Joseph Geschelin. *Automotive and Aviation Industries*, v. 96, Jan. 1, 1947, p. 24-29, 74.

Methods and equipment in producing steering gears, steering gear linkages, propeller shaft assemblies, universal joints, transmission parts, precision bushings for front end suspensions, cam followers, valve guides and pumps for diesel engines, and other specialized items.

20-30. Machinability of Metals. Georg Schlesinger. *Tool Engineer*, v. 17, Jan. 1947, p. 18-27.

Various problems involved in metal cutting. Attempts to strike an average from the enormous variety of possibilities and to derive therefrom practical and generally applicable rules that will be readily understandable to production executives and foremen as well as to operators and inspectors.

20-31. Roll Crushing Plus Diamond Dressing. *Tool Engineer*, v. 17, Jan. 1947, p. 27.

Dual-function wheel dresser consists of a high-precision pantograph, working directly from a templet plus a power-driven roll crusher, both mounted together and accurately related to the spindle. Combination results in a precision and economy in form grinding not achieved by either method alone or by both as independent units.

20-32. Removing Stub Shaft. *Tool Engineer*, v. 17, Jan. 1947, p. 47.

Methods involve use of gunpowder and grease or oil.

20-33. A Tooling Program for Forged Globe Valves. Part III. Carl F. Benner. *Tool & Die Journal*, v. 12, Jan. 1947, p. 72-76.

Six views of the forged brass offset valve body showing the various steps in the machining program. Discusses each operation. (To be continued.)

20-34. Jig Drills Reduce Capital Outlay, Eliminate Setup Time. E. Prange. *Iron Age*, v. 159, Jan. 9, 1947, p. 42-45.

Method of combining small standard drill heads with the drill jigs. These inexpensive units are ideal for relatively light work, and in addition to requiring a very much smaller capital outlay, eliminate the setup time formerly required.

20-35. Wet Belt Machining. Harvey L. Ramsay. *Machine and Tool Blue Book*, v. 43, Jan. 1947, p. 133-141.

Advantages, applications, and benefits to be gained from using the abrasive-belt machining method. Underlying principles, platens, belts, coolants, and automatic feed table, as well as the new centerless abrasive grinder.

20-36. How to Grind Carbide Tools. Part I. H. A. Frommelt. *Machine and Tool Blue Book*, v. 43, Jan. 1947, p. 143-144, 146, 148, 150-152, 154, 156, 158, 160.

The grinding of single point carbides.

20-37. Machining With File Bands. H. J. Chamberland. *Machine and Tool Blue* Book, v. 43, Jan. 1947, p. 162-164, 166-168, 170-171.

Types of filing bands, special uses, sizes. Tests report on the cutting time of band files and the amount of stock removed, and compare findings to previously used methods.

20-38. Broaching. E. Percy Edwards. *Aircraft Production*, v. 8, Dec. 1946, p. 570-573.

Review of tool designs and practice; cutting speeds; coolant; broach maintenance; resharpening.

20-39. Reducing Processing Costs by Functional Hone Abrading. K. W. Connor and L. S. Martz. *Iron Age*, v. 159, Jan. 16, 1947, p. 54-58.

As a result of several new developments in the honing field, it is possible to remove 25 to 30 times as much stock at rates 10 to 12 times faster than was formerly considered practicable. Stone life has been increased as much as 1500% and bore size can be held uniformly and automatically within 0.0003 in.

20-40. Engineering Short Cuts for Screw Machine Departments. C. W. Hinman. *Screw Machine Engineering*, v. 8, Jan. 1947, p. 30-33.

Formulas having an everyday application in the engineering of a screw machine product, tool designing, or operation of automatic screw machine, chucking machine and turret lathe.

20-41. Review Your Tooling Techniques. *Screw Machine Engineering*, v. 8, Jan. 1947, p. 35-37.

Exceptionally well tooled Davenport automatic screw machine setup illustrates many screw machine fundamentals which can be applied daily.

20-42. Use Automatics to Full Capacity. *Screw Machine Engineering*, v. 8, Jan. 1947, p. 49-51.

Capacity of automatic; correct se-

quence of operations and tooling; knurling; deep hole drilling. Marked advantages of using an automatic with a faster spindle speed.

20-43. Designing Tools for Screw Machine Production. *Screw Machine Engineering,* v. 8, Jan. 1947, p. 53-55.
Three applications of combination tooling.

20-44. Lowering Grinding Wheel Maintenance Costs. Russell A. La Combe. *Production Engineering & Management,* v. 19, Jan. 1947, p. 51-54.
Careful handling and proper storage methods virtually eliminate pre-use losses of grinding wheels.

20-45. Time-Saving Techniques With Friction Sawing. H. J. Chamberland. *Production Engineering & Management,* v. 19, Jan. 1947, p. 55-59.
Cutting speeds, production rates and saw specifications resulting from recent tests of process.

20-46. Production Possibilities With Light Machine Tools. P. S. Hoddeson. *Production Engineering & Management,* v. 19, Jan. 947, p. 76-78.
Postwar installations which have been developed with light machine tools in recent months.

20-47. Portable Milling Machine Decreases "Down Time" of Generators. *Machinery,* v. 53, Jan. 1947, p. 155-156.
Has longitudinal feed of 60 in. and is capable of taking cuts ¼ in. deep in cast iron. Is estimated that machine has saved one-third the time and costs required when using two smaller, conventional-type, portable milling machines. Machine consists of a motor-driven spindle, secured to a carriage that can be automatically fed transversely in a saddle. The saddle, in turn, with spindle and carriage, can be fed longitudinally on the bed of the machine.

20-48. New Aluminum Oxide Abrasive Improves Grinding Efficiency. Gordon T. Rideout. *Machinery,* v. 53, Jan. 1947, p. 158-164.
Grinding wheels made of a new fused aluminum abrasive, 32 Alundum, have been developed primarily for machining high-tensile steels, but are also effective on such materials as cast iron, high alloy steels, and some low-tensile metals.

20-49. Ingenious Mechanisms. *Machinery,* v. 53, Jan. 1947, p. 190-192.
Device for automatic shifting between two cam-operated packing mechanisms; mechanism for retarding an automatic feeding device.

20-50. Tool Engineering Ideas. *Machinery,* v. 53, Jan. 1947, p. 193-195.
Helical forming of strip stock without tearing the edge; device for indexing, locating, and feeding lock-washer blanks.

20-51. The Mechanism of Tool Vibration in the Cutting of Steel. R. N. Arnold. *Institution of Mechanical Engineers Journal,* Dec. 1946, p. 261-276; discussion, p. 276-284.
Fundamental investigations. Causes of the phenomenon and limitations of speed, tool frequency, and sharpness, outside of which vibration does not occur. Failure of carbide tools as a result of vibration is shown to occur in the form of a fatigue crack spreading inward parallel to the top face of the tool. Photographs and profile records of surfaces cut under various conditions; also a theoretical analysis. A few practical examples. 13 ref.

20-52. X-Ray Diffraction Analysis of Cold Work Produced by Face Milling. F. Zankl, A. G. Barkow, and A. O. Schmidt. *Iron Age,* v. 159, Jan. 23, 1947, p. 44-50.
Tests show that a negative rake produces more intense and deeper cold working, in addition to requiring more power.

20-53. Mass Production of Electrical Shavers. *Philips Technical Review,* v. 8, Oct. 1946, p. 309.
Photograph shows how the 48 slots are cut in the head of the "Philishave" dry shaver.

20-54. The Machining of Continuous Cast Bronzes. J. B. Jilbert. *Screw Machine Engineering,* v. 8, Dec. 1946, p. 53-55.
Turning, boring and cutting off; drilling; reaming; tapping; milling; and broaching. Proper feeds and speeds.

20-55. Screw Machine Engineering Data Sheet. *Screw Machine Engineering,* v. 8, Dec. 1946, p. 57.
Table gives number of revolutions necessary to reduce work to required diameter and length of cut at given feed per revolution.

20-56. Manhurhin Automatic Lathes. *Screw Machine Engineering,* v. 8, Dec. 1946, p. 69-74.
Specifications and details of fixed spindle type PF and automatic turret type TR.

20-57. Broaching Matches Golf Irons Within $\frac{1}{16}$ Oz. *American Machinist,* v. 91, Jan. 30, 1947, p. 90-91.
Complete sets of irons are now being produced by broaching, and precision of the club head as to shape and weight is controlled by the machine and the setting of the fixtures.

20-58. Practical Ideas. *American Machinist,* v. 91, Jan. 30, 1947, p. 109-116.
Disk eccentrics drive key-seating fixture. Toolpost grinder trues straight-edges. Adjustable center drill cuts to accurate depth. Setscrew wrench.

Built-up snap gages are simple and economical. Feedscrew and taper shank improves lathe tapping. How to shift a center. End pressure holds lenses securely against faceplate. Center the screw on inside calipers. Don't make form cutters too complicated. Small plastic blocks clamped with vacuum chuck. Nonmarking shoe. Adjustable gage sorts round stock accurately. How to align shafting through a wall. Wiggler. Geared fly cutter has built-in feed. Milling machine clamps. Expanding screwdriver. Storage cabinets protect the hydrolap machine rings. Broach a square hole to remove a broken bushing. Crayon marking simplifies gage re-inspection.

20-59. Machining of Stainless Steels. W. H. Crisp and W. Burnan. *Machinery (London)*, v. 70, Jan. 2, 1947, p. 9-13.

Recommendations for production of holes and threads using high speed steel tools.

20-60. Clamps for Jigs and Fixtures. W. H. Litten. *Machinery (London)*, v. 70, Jan. 2, 1947, p. 14-16.

Further uses of the lever and other types of clamps previously discussed.

20-61. Hints on Grinding and Polishing. *Sheet Metal Worker*, v. 38, Jan. 1947, p. 135-136, 182.

Tables give recommended speeds in feet per minute for wheel tips, classification of abrasives, and revolutions per minute to provide wheel tip speeds indicated. Notes on abrasive wheel choice and polishing procedures.

20-62. A New Method of Spacing for Hole Drilling. T. C. Du Mond. *Materials & Methods*, v. 25, Jan. 1947, p. 72-74.

The "Man-Au-Trol", a device which provides for automatic spacing of holes according to a predetermined layout. How it works and what its advantages are.

20-63. A Handy Bending Fixture. Robert Mawson. *Materials & Methods*, v. 25, Jan. 1947, p. 131.

Problem was solved of meeting the two dimensions on the legs of cutting pliers, after the parts had been assembled and hardened.

20-64. Machine Tools. *Russian Technical Research News*, v. 1, no. 5, 1947, p. 2-3.

Survey of recent developments and outline of current research. References.

20-65. New Standard on Tool Life. O. W. Boston. *Steel*, v. 120, Feb. 3, 1947, p. 112, 115-116, 162, 164.

Methods for determining cutting-speed tool-life relationship; factors involved in finding tool life in facing tests based on increasing speed. Other data pertinent to the expected performance of cutting tools.

20-66. Duplicating Cam Surfaces. *Machinery (London)*, v. 70, Jan. 9, 1947, p. 44.

Quick and simple method of duplicating cam surfaces on a surface grinder.

20-67. Buick Cylinder Blocks Now Machined on First Unitized Transfer Line. Joseph Geschelin. *Automotive and Aviation Industries*, v. 96, Feb. 1, 1947, p. 20-27, 62.

Floor plan shows the integration ot the block machine line from start to finish. Each of the machines in the line is a self-contained and automatic unit connected to the next operation by a short length of gravity roller conveyer. Sequence of operations.

20-68. Machining Wrought Aluminum Alloys. E. R. Yarham. *Modern Machine Shop*, v. 19, Feb. 1947, p. 164-166, 169, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 197, 198, 200.

Experiences of some of the leading British companies.

20-69. How Many Teeth in a Carbide Cutter? Carl LeMay. *Modern Machine Shop*, v. 19, Feb. 1947, p. 204, 206, 208.

Steel milling with carbides and determination of the optimum number of teeth that a carbide cutter should have for the best results. Provides a simple and practical method of selection based upon practices currently in use in industry.

20-70. Ideas From Readers. *Modern Machine Shop*, v. 19, Feb. 1947, p. 216, 218, 220, 222, 224, 226.

Magnet aids in solving transmission problem. Spin dimpling tool. Dust collector for belt sander. Fixture to hold thin parts for drilling.

20-71. Micromatic Hone. *Fortune*, v. 35 Feb. 1947, p. 84-89, 154-156, 158-159.

The story of Micromatic Hone Corp. and the special tools which they make.

20-72. Broaching. E. Percy Edwards. *Automobile Engineer*, v. 37, Jan. 1947, p. 27-31.

Machine selection, broach design and broach material. Recommendations are also made concerning broaching speeds and cutting fluids. The importance of fixture design is stressed, and short descriptions are given of machines for broaching cylinder heads and cylinder blocks. (Extracts from paper presented to the Institution of Production Engineers.)

20-73. Machining Magnesium Alloys. Allen G. Gray. *Steel*, v. 120, Feb. 10, 1947, p. 100-102, 111-112.

Special techniques for various machining operations including turning and boring, shaping, planing, milling, drilling.

20-74. Free-Machining Die Steel. *Steel*, v. 120, Feb. 10, 1947, p. 104.

A medium carbon steel having sufficient alloy content to provide air hardening properties may be machined in hardened state. At hardness greater than 300 Brinell, it is only slightly more difficult to machine than fully annealed steels used for same purpose.

20-75. Production Robots Cut Machining Costs. *SAE Journal,* v. 55, Feb. 1947, p. 42-44.

Fundamentals of transfer machine operation and important considerations in transfer machine design. Unusual features of recent installations. Why this machine makes possible great savings in labor and time and even in tooling costs. (From "Transfer Machines—Robots of Production" by J. H. Mansfield.)

20-76. Comparison of Crush Dressing and Diamond Dressing as Applied to Thread Grinding. E. V. Flanders. *Mechanical Engineering,* v. 69, Feb. 1947, p. 123-127.

Results of a series of comparative tests made to evaluate the two methods. Advantages and disadvantages of each method. A decision between the two methods must be based on consideration of the job to be done.

20-77. Practical Ideas. *American Machinist,* v. 91, Feb. 13, 1947, p. 141-148.

Worm wheel milling without centers. Permanent face plate "dog" simplifies shaft turning. Piloted tap aids line tapping. Wire loop and proper oil improves steadyrests. Special steadyrest holds small cylindrical work. Portable coolant system serves many machines. Swinging arm slots screwheads in drill press. Inset-disk cutters give long tool wear. Shaper head in lathe chuck permits boring. Bent screw checking methods. Templet guides tapered helix cutting tool. Two spring winders. Hand bending fixture for light strip stock. Half twist improves quarter-turn belt drives. Bent leg inside mike reaches around boring bar. Blended radius form tool eliminates shoulders.

20-78. High Production on a Single Component. *Production Engineering & Management,* v. 19, Feb. 1947, p. 63-64.

Parts processed are mine hoist drums. Operation consists of turning and grooving the outside diameter of the drum and turning the flanges to size. Machining operations.

20-79. Exacting Manufacture of Parts Accelerated With Ingenious Tools. *Production Engineering & Management,* v. 19, Feb. 1947, p. 66-74.

Equipment and procedures in producing parts for watches at Elgin National Watch Co.

20-80. Machine and Tool Engineering. *Production Engineering & Management,* v. 19, Feb. 1947, p. 75-77.

Rapid Setup for Irregular Parts by George W. Ingham; Production Drilling on a Lathe by Robert Mawson; Threads Cut on Radial Drill by H. E. Richardson.

20-81. Spring-Steel Clutch Plates Require Unusual Operations. Charles H. Wick. *Machinery,* v. 53, Feb. 1947, p. 139-145, 165.

Some of the innovations and unusual operations in setup at Buick Motor Division of the General Motors Corp.

20-82. Operations in the Production of Electronic Tube Components. *Machinery,* v. 53, Feb. 1947, p. 160-164.

Unusual operations performed in the manufacture of rotating anode assembly for X-ray tubes. Among these are tungsten-reinforced copper casting; machining of stainless steel bushings to a wall thickness of only 0.012 in.; glass-to-metal sealing; silver soldering by induction heating in a vacuum; and metallic lubrication of ball bearings.

20-83. Ingenious Mechanisms. *Machinery,* v. 53, Feb. 1947, p. 187-189.

Mechanism for interrupting a feeding device at adjustable predetermined positions. Method developed for bonding plastics to metals.

20-84. Tool Engineering Ideas. *Machinery,* v. 53, Feb. 1947, p. 191-194.

Precision turning on small drilling machines. Universal boring-bar holder designed especially to obtain rigidity. Unusual lathe setup for making model propellers from a master.

20-85. Fundamentals and Applications of Carbide Milling. A. O. Schmidt. *Tool Engineer,* v. 18, Feb. 1947, p. 31-35.

The application of thermodynamic principles to metal cutting. Tool life and rate of production are increased by choosing correct speed rather than the highest possible speed. Also negative rake tools last longer. Advantages and disadvantages of chromium plating of carbide cutters.

20-86. Drilling and Boring Tools. *Tool Engineer,* v. 18, Feb. 1947, p. 47-48.

Types of drill jigs and fixtures, and their construction.

20-87. How to Use Carbide Cutters for Milling. Parts I and II. H. A. Frommelt. *Iron Age,* v. 159, Feb. 13, 1947, p. 44-49; Feb. 20, 1947, p. 48-53.

General concept of carbide milling with special emphasis on cutter angles and power requirements. Application of carbides to the milling of low-carbon steels. Problem of the built-up edge, and information on the most suitable cutting and clearance angles with specific examples of milling boiler plate, S.A.E. X1020, wrought iron and low-carbon steel. Speeds and feeds; the K-land and K-factor.

20-88. Influence on Tool Life and Power of Nose Radius, Chamfer, and Peripheral-Cutting-Edge Angle When Face-Milling a 40,000-Psi. Cast Iron. O. W. Boston and W. W. Gilbert. *Transactions of the American Society of Mechanical Engineers,* v. 69, Feb. 1947, p. 117-124.

Results obtained in studying the effect on tool life, nature of tool wear, and power requirements when varying successively the nose radius, width of chamfer at 45° from the cutter face, and the peripheral cutting-edge angle in face-milling cast iron.

20-89. Results of an Investigation of the Removal of Metals by the Process of Grinding. R. E. McKee, R. S. Moore and O. W. Boston. *Transactions of the American Society of Mechanical Engineers,* v. 69, Feb. 1947, p. 125-129.

The influence of grinding wheels, grinding compounds, and other pertinent factors on the process of cylindrical grinding.

20-90. Can This Part Be Made in One Setup on an Automatic Screw Machine? *Screw Machine Engineering,* v. 8, Feb. 1947, p. 40-44.

Part referred to is a small item used in I.B.M. machines. It consists of a shaft with one end rounded, tapered, and bent to a slight curve; and having a six-tooth gear as an integral part, near the center of the shaft. How I.B.M. engineers solved the machining problem.

20-91. Engineering Short Cuts for Screw Machine Departments. Part II. C. W. Hinman. *Screw Machine Engineering,* v. 8, Feb. 1947, p. 45-47.

Simple fixture permits quick and accurate measuring of cams in either the engineering department or at the machine on which the cam is to be used.

20-92. Designing Tools for Screw Machine Production. *Screw Machine Engineering,* v. 8, Feb. 1947, p. 53-56.

Circular-tool step corrections.

20-93. Vibration Vs. Precision in Single Point Boring Tools. A. W. Ehlers. *Tool & Die Journal,* v. 12, Feb. 1947, p. 68-70.

Development and application of press-fitted boring-bar extension cap of dissimilar metal which resulted in sufficient vibration dampening to permit an increase of boring bar length: diameter ratio to 5:1 for working cast iron and 5½:1 for aluminum.

20-94. Wet Turning With Cemented Carbide Tools. W. Iwascheff. *Machinery (London),* v. 70, Jan. 23, 1947, p. 112-113.

Experiments undertaken in Germany during the war on shell turning operations. Shell forgings were turned at a cutting speed of 260 ft. per min. with a feed of 0.03 in., and depths of cut of 0.16, 0.24, and 0.32 in.

20-95. Torpedo Propeller-Blade Surfacing. G. L. Brown. *Engineering,* v. 163, Jan. 24, 1947, p. 73-76.

Torpedo propellers, designed in Australia, required blades with a driving surface of helicoid form, with pitch increasing uniformly with the radius from the axis. A mechanism was designed to reduce the blade surfaces to the required form by grinding.

20-96. Profile Grinding Machine With Optical Control. *Engineering,* v. 163, Jan. 24, 1947, p. 80-82, 84.

Machine manufactured in Canada illustrated and described.

20-97. Good and Bad Structures in Machining Steel. Norman E. Woldman. *Materials & Methods,* v. 25, Feb. 1947, p. 80-86.

Case histories of several steels showing why they were or were not of the right structure or condition for satisfactory machining.

20-98. Toolsteel Tubing. Edwin Laird Cady. *Materials & Methods,* v. 25, Feb. 1947, p. 87-89.

Many parts now machined from solid toolsteel could be made from toolsteel tubing, which is available in oil, air and water hardening grades. Wide range of sizes can be used for a variety of tools, dies and other parts.

20-99. Increasing the Life of Machine Tool Parts. E. W. Nelson. *Materials & Methods,* v. 25, Feb. 1947, p. 133.

How a cast iron guide-rest was tipped with cemented carbide to improve its wear resistance.

20-100. The Lathe Used as a Broaching Machine. Bernard E. Frank. *Materials & Methods,* v. 25, Feb. 1947, p. 135.

How a lathe can be adapted for broaching operations.

20-101. High-Precision Thread-Grinding Machine. *Engineering,* v. 163, Jan. 31, 1947, p. 104-105.

Details of construction and operation of machine for production of small screws which are manufactured by a British company.

20-102. Modern Centerless Grinding Practice. Part I. D. E. Lower. *Machine and Tool Blue Book,* v. 43, Feb. 1947, p. 135-144, 146, 148.

Advantages of the method and some of the jobs performed. Analyzes grinding of fuel injection plungers for bombers. Limits on this job were ± 0.000005 in.

20-103. West Coast Diesel Manufacturers Speed Output. Harvey S. Peters. *Western Machinery and Steel World,* v. 38 Feb. 1947, p. 94-97, 108, 123.

Machining data of the horizontal boring, drilling and milling machine. Photographs of different operations.

20-104. Tool Life and the Selection of Carbides. (Concluded.) Raymond O. Catland. *Western Machinery and Steel World,* v. 38, Feb. 1947, p. 109-112.

Force vs. cutting position; force vs. speed; force vs. rake angles; tool life vs. work position; effect of flywheel on the cutting forces.

20-105. Cutting-Off Small-Diameter Tubing. *Machinery (London),* v. 70, Jan. 30, 1947, p. 140-141.

Satisfactory method for cutting-off tubing of ⅛-in. diameter and 1/16-in. bore.

20-106. Plunge Grinding. *Aircraft Production,* v. 9, Feb. 1947, p. 43-45.

Combination of profile turning and blending, which has been applied to the hub for a two-bladed airscrew. Dimensional details and wheel profile of an operating link of which the whole form is finished by plunge grinding.

20-107. How to Use Carbide Cutters for Milling Straight Carbon and Cast Steel. Part III. H. A. Frommelt. *Iron Age,* v. 159, Feb. 27, 1947, p. 47-52.

Milling of straight carbon steels, in the rolled or forged condition, and of cast steel. Advantages of employing a heavy chip load and a high K-factor. Underlying reasons for the use of a relatively small number of blades in the cutters. A method of setting the blades in place while the cutter is held in the machine.

20-108. Some Metallurgical Factors Which Affect Machinability With Special Reference to Intermittent Cutting. K. J. B. Wolfe. *Metal Treatment,* v. 13, Winter 1946-1947, p. 225-247.

Results of an investigation into metallurgical problems encountered in gear cutting, using microscopical, tensile, Meyer hardness, X-ray, magnetic and internal stress determinations. Temperature developed by the cutting edge and temperature of the chips removed. Machinability of hardened steels, particularly the more highly alloyed ones, is much improved by a second tempering at about 25° C. lower than the first.

20-109. Save Minutes, Make More Profit Jig Boring. Frank Zagar. *American Machinist,* v. 91, Feb. 27, 1947, p. 78-80.

Production use of jig borers discloses the need for a simple hole-dimension chart. Value of tool sets for each job, collet attachments and better clamping.

20-110. Practical Ideas. *American Machinist,* v. 91, Feb. 27, 1947, p. 101-108.

Radius attachment and nose chuck refit old lathe. Telescoping support centers boring bars. Grinding large radii with small wheels. Drillrod tool and holder bores small holes. Threaded drill bushing eliminates changing jigs. Shaper tool extension cuts inside surfaces. Hints on small tools. How to machine large circular sectors. V-block simplifies thread pitch measurements. How to square fractions—discussion. Double-acting fixture speeds screw slotting. Crush-forming tool dresses surface grinder. Adjustable cone mandrel holds thin tubing.

20-111. Cutting Speeds With High Speed Steel Tools. *American Machinist,* v. 91, Feb. 27, 1947, p. 125.

Turning, drilling and tapping speeds and cutting fluids with various types of high speed steel tools.

20-112. Clamps for Jigs and Fixtures. (Continued.) W. H. Litten. *Machinery (London),* v. 70, Feb. 6, 1947, p. 174-175.

Various clamping devices used for securing components in jigs, and work-pieces or jigs to the tables of machine tools.

20-113. The DeVlieg No. 3B Jigmil. *Machinery (London),* v. 70, Feb. 6, 1947, p. 177-181.

Combined jig boring and milling machine will handle a wide variety of work up to 2 tons in weight. Ample power and rigidity are provided to enable precision milling operations to be performed without impairing the accuracy of the machine for boring. Not only may jigs and fixtures be bored and milled conveniently at one setting of the work on the table, but small quantities of repetition parts can be expeditiously handled. Arrangement for automatic setting of the spindle head and table saddle to an accuracy of 0.0001 in.

20-114. Band Sawing Light Metals at High Velocities. H. J. Chamberland. *Modern Metals,* v. 3, Feb. 1947, p. 26-28.

Advantages of sawing, cutting and machining light metals.

20-115. Time-Saving Methods in Canadian National Shops. Howard Campbell. *Modern Machine Shop,* v. 19, March 1947, p. 124-130, 132.

A number of tools developed to save time and increase accuracy and efficiency.

20-116. Reducing Three Operations to One. Norman Iversen. *Modern Machine Shop,* v. 19, March 1947, p. 198, 200.

Through the use of broach inserts, a production part that formerly required three milling operations to finish is now finished in one operation. Workpiece is one of four pieces required in a toggle tool assembly used on assembly operations, all of which are finished in the same manner. Broaching operation is performed in a vertical surface broaching machine of 10 tons capacity, having a cutting stroke of 48 in.

20-117. Mass Production—of Chips. *Iron Age,* v. 159, Feb. 27, 1947, p. 46; *Modern Machine Shop,* v. 19, March 1947, p. 200, 205.

Parts are mine hoist drums, 20 ft. in diameter with a flange 21½ ft. in diameter. Specially designed pit lathe is used for work and machining. Machining consists of first roughing the flange sides and face and drum o.d., and then plunge cutting the grooves in the drum in which the 2½-in. wide mine hoist cable is to lie. Grooves are finish formed.

20-118. Ideas From Readers. *Modern Machine Shop,* v. 19, March 1947, p. 206, 208, 210, 212, 214.

A simple expanding fixture. Safety "kink" for monorail system. Facing tool for Van Stone flanges.

20-119. Thurst-Pound Loads Developed in Drilling Various Metals. *Modern Machine Shop,* v. 19, March 1947, p. 222.

Covers cast iron, machine steel, cast steel and carbon steel.

20-120. Latest Automatic Machine Methods Hold Tolerance to 30 Millionths of Inch. Joseph Geschelin. *Automotive and Aviation Industries,* v. 96, March 1, 1947, p. 18-21, 56.

Factors used in turning out fuel injectors at the ultramodern plant of G.M. Diesel Equipment Division, maintaining high level of quality in finish, tolerances and clearances of mating parts.

20-121. Piston Tooling Innovations. *Automotive and Aviation Industries,* v. 96, March 1, 1947, p. 34-35, 45.

Equipment and procedures at Zollner Machine Works are applicable to almost any type of piston and any volume of production.

20-122. Elimination of Vibration in Machine Tools. R. C. Griffith. *Industrial Diamond Review,* v. 7. Feb. 1947, p. 33-34.

General methods, and a few examples of actual problems and their solution. (Presented at Machine Tool Forum, Westinghouse Electric Corp., April 1946.)

20-123. Giant Gear Generator Cuts Rolling Mill Pinions. *Iron Age,* v. 159, March 6, 1947, p. 71.

Some details of planer-type generator designed specifically for use in cutting continuous herringbone gears up to 20-ft. diameter and 66-in. face width; cutters are oil hydraulic operated by the two cylinders set at 120° included angle. Cutter block guides are fixed and 30° single helical or 30° continuous herringbone gears can be cut. Operation of the cutter drive is by means of a variable stroke hydraulic pump located in the main pump tank and driven by a 50-hp. motor.

20-124. How to Use Carbide Cutters for Milling. H. A. Frommelt. *Iron Age,* v. 159, March 6, 1947, p. 74-78.

Various factors governing the choice of milling speeds and feeds for heat treated steels, together with some consideration of chip formation, cutter life and surface finish. The necessity for insuring rigidity in both workpiece and cutter; practical examples from actual shop experience.

20-125. One Setup for Roughing, Finishing and Counterboring. A. W. Ehlers. *Tool & Die Journal,* v. 12, March 1947, p. 69-71.

Experiments on cast iron parts. Roughing and finishing boring bars with the tool pattern and the pilot steps for the counterboring tools. Tool life of the counterboring tools was not as long as the regular roughing or finishing tools. Single setup of roughing, finishing and counterboring may be extended in scope and utility if solid carbide boring bars could be designed.

20-126. A Tooling Program for Forged Globe Valves. Part V. Carl F. Benner. *Tool & Die Journal,* v. 12, March 1947, p. 79-84, 136, 138.

The other components which make up a complete Parker offset globe valve assembly in addition to the forged brass valve body. Cross-sectional view of the valve with the individual parts grouped around it. The machining operations, and tools and machines used. (To be continued.)

20-127. How to Machine Aluminum and Magnesium With Carbide Tools. Carroll Edgar. *Tool & Die Journal,* v. 12, March 1947, p. 86-87, 90.

General machine considerations; feeds and speeds; tools; coolants.

20-128. How to Use Carbide Cutters for Milling. Part V. H. A. Frommelt. *Iron Age,* v. 159, March 13, 1947, p. 52-56.

Milling of alloy steels with carbide cutters is discussed with particular reference to those materials usually considered difficult to machine, including armor plate, heat treated S.A.E. 4340, S.A.E. X1020, stress-proof steel and die plates. Examples are taken from actual shop practice. Feeds, speeds and cutter angles and the reason for their selection.

20-129. Semi-Automatic Operation Obtained by Push-Button Control. Stuart G. Leonard. *Electrical Manufacturing,* v. 39, March 1947, p. 110-112, 114.

The complete integration of electrical, mechanical, pneumatic, and hydraulic functions in a small precision gear shaper, with all the controls built in.

20-130. Thread Position Gages. *Machinery (London),* v. 70, Feb. 13, 1947, p. 195-197.

Methods of manufacture concern screw-ring gages incorporating positional features having reference to the start of the thread. Function of gages is to control the machining of pairs of screwed parts in such a way that features of mating components assume their correct angular relationship when the parts are screwed home.

20-131. The Mechanism of Tool Vibration in the Cutting of Steel. *Machinery (London),* v. 70, Feb. 13, 1947, p. 204-208.
Numerous influences to which a tool is subjected during cutting, the means by which energy may be absorbed or dissipated, and the way in which these factors are modified by vibration. (Abstract of a report of the Institution of Mechanical Engineers Subcommittee on Carbide Tools, prepared by Prof. R. N. Arnold.)

20-132. Air Fixtures Speed Hollow Milling. Kenneth F. Brooks. *American Machinist,* v. 91, March 13, 1947, p. 106-107.
How washing-machine wringer eccentric has ends finished on drill-press at 200 finished pieces per hr. Pneumatic fixtures avoid difficult lathe-chucking operation.

20-133. Devised—a Better Method for Sharpening Carbide Face Mills. G. W. Sharp. *American Machinist,* v. 91, March 13, 1947, p. 108-110.
Two methods for grinding cutter blades individually.

20-134. Production Methods Aid Carbide Control. Harold L. Flynn. *American Machinist,* v. 91, March 13, 1947, p. 125-128.
Line production and simplification of standard tool requisitions have resulted in long-run economy, efficient carbide tool grinding, improved routing and ordering at Jack & Heintz.

20-135. Practical Ideas. *American Machinist,* v. 91, March 13, 1947, p. 141-148.
Adjustable auto-transformer and knee switches for small tools. Cylindrical pins make good T-heads. Fly-tool milling cutter removes sand or scale. Circular guide races provide uniform lapping motion. Hints on small tools. How to remove a heavy lathe chuck. Graded block sets aid clamping buildups. Faceplate mounted unit grinds inside castings. Use the bandsaw and save material. Connecting rod controls large-radii turning. Tension chuck improves coil-winder rigidity. Rosan insert permits 360° elbow positioning.

20-136. Tooling for Fabrication of Stainless Steel. John C. Whitesell. *Steel Processing,* v. 33, Feb. 1947, p. 85-89, 112; *Tool Engineer,* v. 18, March 1947, p. 18-22.
Various tools employed by Red Lion plant of the Budd Co.

20-137. High-Production Broaching of Automobile Connecting Rods. *Machinery,* v. 53, March 1947, p. 160.
Crankshaft ends and caps of automotive connecting rods are completely machined at the rate of 150 pieces per hr. on the dual-ram broaching machine. Three separate broaching operations and one slitting operation are combined on 15-ton, 66-in. stroke machine.

20-138. What Happens in Using Steel Disintegrators? H. V. Harding. *Machinery,* v. 53, March 1947, p. 161-164.
The development of steel disintegrators, the theory of their operation, applications, and savings effected by their use. Eliminates the scraping of work in which broken tools are embedded. Details of one type of disintegrator.

20-139. A Nonreversible Rack and Pinion Motion. L. Kasper. *Machinery,* v. 53, March 1947, p. 175-176.
Movement of the rack can be obtained only by rotation of the pinion, and the mechanism is locked to prevent movement of the rack against the pinion.

20-140. Tool Engineering Ideas. *Machinery,* v. 53, March 1947, p. 177-179.
Adjustable boring fixture for machining fillets to different radii by Joseph G. Goulette. Automatic hydraulic knurling fixtures by C. T. Packer. Gage for measuring taper per inch by H. Moore.

20-141. Photographic Studies Contribute to Better Machining Methods. Norman Zlatin. *Steel,* v. 120, March 17, 1947, p. 94-97, 131-132.
Mechanism of metal cutting, captured by the camera's eye, provides documentary evidence of need for changes in metal structure, tooling, and even in machine tools themselves. "Stopped" action techniques are practical and yield much information that can be gained in no other manner.

20-142. Production Processes. Part XXI. Roger W. Bolz. *Machine Design,* v. 19, March 1947, p. 123-131.
General considerations for production milling.

20-143. Square Milling on the Automatic Screw Machine. *Screw Machine Engineering,* v. 8, March 1947, p. 39, 42-44.
Typical example of a part which could be processed by at least three different methods, yet only one is truly economical. Part is completely finished in 12 sec. on a $\frac{9}{16}$ RA6 Acme Gridley multiple-spindle bar machine.

20-144. Thread Rolling on the Brown & Sharpe Automatic Screw Machine. *Screw Machine Engineering,* v. 8, March 1947, p. 45-47.

Features a versatile tool which, with proper application, can be economically used for thousands of jobs.

20-145. Cone Four-Spindle Vertical Bar Machine. *Screw Machine Engineering,* v. 8. March 1947, p. 56-60.

Design of the vertical Conomatic provides four horizontal work spindles in a vertical row or plane with all work spindles held in one stationary spindle cabinet. Bar stock is presented to quadruplicate tools held in each of the machine's two cross slides and one end working slide; thus four pieces are produced simultaneously. Construction details.

20-146. How to Use Carbide Cutters for Milling Stainless Steels. Part VI. H. A. Frommelt. *Iron Age,* v. 159, March 20, 1947, p. 56-59.

Recommendations for the most suitable blade angles for Type 304 on the one hand, and all other types on the other hand, are made on the basis of a detailed research program in which many hundreds of experimental cuts were made under carefully controlled conditions.

20-147. Tooling Standard Machines for High-Speed Production. R. A. La Combe. *Production Engineering & Management,* v. 19, March 1947, p. 53-56.

Volume output of precision parts for new automatic washing machine is reached in record time with specially tooled standard machines. From an initial production rate of 150 units per month, the schedule has been increased to well in excess of 500 units daily.

20-148. Increased Spindle Speeds Cut Operation Time on Light Metals. Carroll Edgar. *Production Engineering & Management,* v. 19, March 1947, v. 57-58.

Recommended speeds and feeds, suggested coolants, and tool-grinding data for machining magnesium and aluminum with carbides.

20-149. Skillful Tooling Increases Output on Quality-Controlled Operations. *Production Engineering & Management,* v. 19, March 1947, p. 68-74.

Special-purpose tooling, skillfully designed jigs and fixtures, and an effective use of productive floor space, which has enabled Sundstrand to reach a product output of approximately 2500 complete units per day with an anticipated production for this year of 600,000 fuel pump units.

20-150. Friction Sawing Lowers Cutting Cost. *Production Engineering & Management,* v 19, March 1947, p. 82.

Improvement in friction sawing centers mostly around proper cooling of the blade; efficiency of friction sawing increases with the rim velocity for speeds up to about 20,000 ft. per min. and remains nearly constant for higher values. One blade can handle the entire day's production of a modern steel warehouse, cutting many varied structural shapes. Each blade is reused after redressing as often as 60 times before finally becoming too small for further service.

20-151. The Crib. *Production Engineering & Management,* v. 19, March 1947, p. 87.

Setup for quick loading by Seymour Marcus. Foot-control for drill by Theodore C. Meadow.

20-152. Machining Magnesium. *Machine and Tool Blue Book,* v. 43, March 1947, p. 135-140, 142, 144, 146, 148, 150.

Fundamentals of machining magnesium. Milling operations, drilling, turning, boring, sawing, planing, and shaping. The proper cutting tools to be used with the various machining operations.

20-153. How to Grind Carbide Tools. Part II. H. A. Frommelt. *Machine and Tool Blue Book,* v. 43, March 1947, p. 153-154, 156-158, 160, 162, 164, 166-168, 170.

Methods used to grind milling cutters. Grinding of blades with the cutters inserted in the body, and the grinding of blades separately.

20-154. Modern Centerless Grinding Practice. Part II. Machines Attachment and Blades. D. E. Lower. *Machine and Tool Blue Book,* v. 43, March 1947, p. 243-246, 248-250, 252, 254-256, 258, 260.

Types of machines used and methods of operation. Workholding, loading, and feeding attachments and blades (angles employed and thicknesses).

20-155. Wet Belt Machining Method. William F. Schleicher. *Aluminum and Magnesium,* v. 3, Feb. 1947, p. 8-10, 20, 22.

Various operations performed by this method. Principles of wet belt machining and information on jigs, fixtures, and coolants.

20-156. Machining and Machinability. Francis W. Boulger. *Metals Review,* v. 20, March 1947, p. 5-8, 51.

Developments in practices, tests, and theories reflected by recent technical literature. Machines and tools; negative-rake tools; shaving, hobbing, honing; crush-dressing; abrasive-belt grinding; high speed band sawing; machinability; metal cutting theory.

20-157. Machine Tools and Tool Materials as Described by the Manufacturers. *Metals Review,* v. 20, March 1947, p. 9-12.

New products and equipment for metal cutting developed during the

past 12 months. Emphasis is on metallurgical developments in machining operations rather than construction and operation.

20-158. Automatic Lathe Speeds Cutoff Operations. *Iron Age,* v. 159, March 27, 1947, p. 47.

Hydralectric automatic lathe is designed to fill the demand for a high-production machine for chamfering and cutting-off a large variety of parts made from pipe, tubing, or solid bar stock.

20-159. Air-Operated Eccentric Fixture Simplifies Broaching. *Iron Age,* v. 159, March 27, 1947, p. 52.

Simplifies the broaching of keyway slots in the bores of heavy-duty steering knuckles. Also eliminates the necessity of loading the part over the broach. Machine described is a 10-ton Colonial utility hydraulic press equipped with a standard Colonial pull-down broaching attachment.

20-160. How to Use Carbide Cutters for Milling. Part VII. H. A. Frommelt. *Iron Age,* v. 159, March 27, 1947, p. 58-62.

Semisteel, alloy cast iron and ni-resist can now be milled at a high rate of speed and with excellent tool life by the proper application of carbide cutters. Examples taken from actual shop practice; the difference in technique for machining these materials, as compared with regular cast iron, and optimum machine and cutter settings.

20-161. Special Tool Designed for Reaming Punches. Robert Mawson. *Materials & Methods,* v. 25, March 1947, p. 132-133.

Tool developed to manufacture a quantity of punches made of tungsten steel, when specifications called for the hole to be perfectly straight and with no tool marks.

20-162. Good Fixtures Make Broaching Suitable for Many Jobs. Harry H. Gotberg. *American Machinist,* v. 91, March 27, 1947, p. 90-92.

Variety of setups that can be made to work on standard equipment.

20-163. Hard Faced Dies Make Drums. John A. Gallaher. *American Machinist,* v. 91, March 27, 1947, p. 101-103.

How record production has been attained with hard faced forming and cutting tools in fabrication of steel containers for dry materials.

20-164. Practical Ideas. *American Machinist,* v. 91, March 27, 1947, p. 111-116.

Horizontal crank press swages tubes automatically. Toggle-clamp base makes vernier height gage. Cutoff fixtures improve pin and screw production. Flit-gun vacuum principle ejects small slugs. Hints on small tools. Radius-turning tool requires minimum machining. Straightedge tester gives complete graphic record. Combination reamer saves two turret steps.

20-165. Thrust Loads in Drilling Various Metals. *American Machinist,* v. 91, March 27, 1947, p. 139.

Tables give feed in inches per revolution for cast iron, machine steel, cast steel and carbon steel.

20-166. Method of Drilling and Tapping Carbides to Expand Their Applications. *Steel,* v. 120, March 31, 1947, p. 94.

Process in which machinable materials are solidly embedded in the carbide parts wherever the parts are to be drilled or tapped.

20-167. The Surface Broaching Operation in the Field of Metal Machining. George Squibb. *Modern Machine Shop,* v. 19, April 1947, p. 168-170, 172, 174, 176, 178, 180.

Various broaching machines and operations performed on them.

20-168. Ideas From Readers. *Modern Machine Shop,* v. 19, April 1947, p. 212, 214, 216, 218-220, 222.

Novel tool cabinet. Cutting groove in special arbor. Simplified pin measurement method for gibs and dovetails. Facing sea-chest flange with radial drill.

20-169. Bevel Gears. G. W. Nash. *Automobile Engineer,* v. 37, Feb. 1947, p. 71-76.

Production and testing of bevel gears of all types. Characteristics of the various types and the importance of accurate machining of blanks. The Revacycle machine for producing straight bevels and machines for producing spiral bevel, Zerol, and Hypoid bevel gears. Grinding and lapping operations; chucking equipment; and testing devices.

20-170. Investigation of the Lapping Process. Part II. F. Eugenè. *Industrial Diamond Review,* v. 7, March 1947, p. 67-71.

Concludes report on an extensive comparative study of different lapping abrasives and materials. Includes a comparison between smooth and grooved laps. Photomicrographs of the different lap metals used are presented. (Condensed from *Travaux et Memoirs du Laboratoire des Industries Mecaniques,* v. 2, 1945, p. 9-33.)

20-171. Simplified Formulas for Grinding and Checking Tapers. Charles L. Hall. *Production Engineering & Management,* v. 19, April 1947, p. 75.

Formulas given will be found useful in toolrooms when taper plug gages and taper ring gages are being processed. They would prove to be of value on shop work involving unknown dimensions for tapers.

20-172. Machine and Tool Engineering. *Production Engineering & Management,* v. 19, April 1947, p. 76-77.

Includes the following brief items by separate authors: Fly Cutting Bored Holes; Cam-Operated Crowning Unit; Handling of Gear Blanks.

20-173. Production Data Sheet. *Production Engineering & Management,* v. 19, April 1947, p. 83.

Practical tool speeds for average work.

20-174. A Tooling Program for Forged Globe Valves. Part VI. Carl F. Benner. *Tool & Die Journal,* v. 13, April 1947, p. 73-78, 133.

The machining operations on the packing cap used on Parker globe valves.

20-175. Machining With Precision Saw Blades. H. J. Chamberland. *Tool & Die Journal,* v. 13, April 1947, p. 79-81.

Case histories of various laboratory tests to determine the correct type of saw, velocity, and work pressure that will produce a maximum cutting rate consistent with tool life.

20-176. Twenty-Five Single Point Tool Operations at One Setup. *Tool & Die Journal,* v. 13, April 1947, p. 82-84.

Eight-position turret lathe designed for turning, boring, or threading parts up to 6 in. in diameter which have been blanked out on automatic screw machines or turret lathes; or for finishing stampings, castings, forgings, and many other types of work that ordinarily require many individual setups.

20-177. Fast Jig and Fixture Setups. *Tool & Die Journal,* v. 13, April 1947, p. 85-88.

Speed Jig is made up of a small and simple variety of elementary but precision-made members that can be easily and accurately assembled into an unlimited variety of jig and fixture patterns for the economical small-lot production of interchangeable parts requiring the drilling and reaming of such hole layout patterns as circular, square, rectangular, or irregular, in one or more planes.

20-178. Thread Rolling Steel Parts on the Automatic Screw Machine. E. P. Ranney. *Screw Machine Engineering,* v. 8, April 1947, p. 33-38.

Sequence of operations on 1-in. RA6 Acme Gridley bar machine featuring the even spread of tooling over the six end working positions and roll threading which makes it possible to produce part complete at a single setup.

20-179. Where Do You Stop in Applying Cam Technique? *Screw Machine Engineering,* v. 8, April 1947, p. 40-41, 44-45.

Secondary operation work on the Brown & Sharpe automatic. Job is processed until an inexpensive, though highly productive, tooling arrangement is reached. Camming technique which, when understood, can be profitably applied without increasing cost of tooling the job.

20-180. Hardinge Multi-Operation Chucking Machine. *Screw Machine Engineering,* v. 8, April 1947, p. 57-60.

Some of its outstanding features.

20-181. Kennamilling. H. A. Frommelt. *Tool Engineer,* v. 18, April 1947, p. 23-27.

The technique of milling as resulting from the union of a carbide, suited to metal removal according to the milling process, and a suitable tool holder. Examples and economies.

20-182. Precision Lapping by the Centerless Method. Peter L. Sommer, Jr. *Tool Engineer,* v. 18, April 1947, p. 33-34.

Simple but positive operating principle produces uniform precision finish to less than 2 micro-inches.

20-183. Drilling and Boring Tools. *Tool Engineer,* v. 18, April 1947, p. 57-58.

An application of a bushing installation used when a drilled hole is to be followed by a tapping or reaming operation. The drill bushing is mounted in a receding cage, and enters a bushing in the jig which is of sufficient i.d. to clear the next tool. An application is shown for two-station fixture, where a part is first drilled in one of the two spindles of a two-spindle drill press, and then moved to the other spindle for tapping.

20-184. The Manufacture of Automobile Springs and Bumpers From Raw Material to Finished Stock. John B. Rauen. *Western Metals,* v. 5, April 1947, p. 18-21.

An account of production at U.S. Spring & Bumper Co.

20-185. Carbides on Railroad Jobs. Part I. Carroll Edgar. *Railway Mechanical Engineer,* v. 121, April 1947, p. 189-195.

Various factors that influence the use of carbide tools on the jobs and machines usually found in the average shop.

20-186. Operation of an Engine Lathe. *Machine and Tool Blue Book,* v. 43, April 1947, p. 135-140, 142, 144, 146.

Parts of a lathe that hold the workpiece and control its motion or rotating speed.

20-187. Using Carbides in Metalworking. H. A. Frommelt. *Machine and Tool Blue Book,* v. 43, April 1947, p. 147-148, 150, 152, 154, 156.

Procedure used to mill a steel component 2x4x20 in. using a milling machine which had been considered too light for carbide milling.

20-188. Multiple Tool Holder Attached to Shaper Solves Machining Problem. Gerhardt P. Niesel and Herbert R. Steidtmann. *Machine and Tool Blue Book,* v. 43, April 1947, p. 185-190.

Use and construction of the multiple tool holder.

20-189. Modern Centerless Grinding Practice. Part III. D. E. Lower. *Machine and Tool Blue Book,* v. 43, April 1947, p. 199-200, 202, 204, 206, 208, 210-213.

The proper selection of grinding wheels and the necessity for plenty of coolants. Table of grinding-wheel recommendations for specific jobs and materials.

20-190. Thrust Loads Due to Drilling Various Metals. *Machine and Tool Blue Book,* v. 43, April 1947, p. 282.

Table covers cast iron, machine steel, cast steel, and carbon steel.

20-191. Ingenious Equipment Used in Making Split Bushings at a Ford "Hydro" Plant. Charles H. Wick. *Machinery,* v. 53, April 1947, p. 141-146.

Manufacturing methods and ingenious machinery used in producing split-type valve guide bushings.

20-192. Rotary Power Filing Technique. *Machinery,* v. 53, April 1947, p. 165-167.

Types of rotary files and burrs; methods of selecting them; operating speeds for various metals.

20-193. Superfinishing Methods and Applications. Part II. E. L. Hemingway. *Machinery,* v. 53, April 1947, p. 168-171.

Typical applications of the superfinishing process on bearings and shop tools, and for inspection work.

20-194. Diamond or Crush-Dressed Wheels for Contour Grinding? Fred Victory. *Machinery* v. 53, April 1947, p. 172-177.

Factors determining the choice between diamond-dressing and crush-dressing a wheel for contour grinding. Advantages and applications of each method.

20-195. Production "Firsts" at Plymouth's Enlarged Plant. Joseph Geschelin. *Automotive and Aviation Industries,* v. 96, April 1, 1947, p. 28-32, 78, 82, 84.

A comprehensive study of accomplishments by Plymouth management in creating an advanced-type plant for mass production of passenger cars.

20-196. Modern Band Sawing Practice. H. J. Chamberland. *Iron Age,* v. 159, April 17, 1947, p. 64-66.

Technique and detailed information on friction sawing, in which velocities as great as 15,000 ft. per min. are used in steel.

20-197. How to Use Carbide Cutters for Milling. Part VIII. H. A. Frommelt. *Iron Age,* v. 159, April 10, 1947, p. 78-81.

Various factors which govern the life of a carbide cutter. Actual wear on the various edges and its causes; chipping and breakage. Selection of various grades of carbide for different jobs; optimum feed rates; a method of selecting feed rates to suit varying conditions.

20-198. How to Use Carbide Cutters for Milling. Part IX. H. A. Frommelt. *Iron Age,* v. 159, April 17, 1947, p. 58-63.

Some practical applications of the factors governing cutter life together with information on cutter design, types of blades, and grinding technique.

20-199. Novel Tools Cut Cost of Gear Sector. Kenneth F. Brooks. *American Machinist,* v. 91, April 10, 1947, p. 93-95.

How 2000 close-grain iron gear-sector castings are machined each day. Only five machining and one subassembly operation are necessary to prepare 1½-lb. castings for delivery to the assembly line. Except for the Kingsbury drilling and reaming machine, all machines in group are general-purpose units, special tooling being employed to increase machining efficiency.

20-200. What AC Learned in Broaching Two Parts. Rupert Le Grand. *American Machinist,* v. 91, April 10, 1947, p. 100-101.

Two parts manufactured by AC Spark Plug Division, General Motors Corp., provide case examples of broach development. Design details and pertinent features.

20-201. Practical Ideas. *Amercan Machinist,* v. 91, April 10, 1947, p. 135-140.

Single indicator setting tests inserted cone cutters. Angle table speeds cutter rake-angle grinding. Small thread and gear-measuring pin technique. High-speed assembling fixture cuts noise and lost motion. Three-legged plug gage has wide adjustability. Contour-milling device uses cam and one-way clutch. Keyed broach maintains accurate alignment. Centered bronze lap trues universal chucks. Jam nuts make free-swiveling compound do ball turning.

20-202. New Applications of Roto-Shaving in Mass Production Increase Output and Cut Costs. *Automotive and Aviation Industries,* v. 96, April 15, 1947, p 28-29, 68.

Three Red Ring Roto-Shavers for finishing the back face of rear-axle ring gears, the flange diameter and face of differential to required dimensional tolerances, axial alignment, and finish in one setting, and to finish simultaneously the outside diameter of

both hubs as well as the shoulder. Diameters are readily held to a tolerance of 0.001 in.

20-203. How to Set Up Carbide Milling Jobs. H. A. Frommelt. *American Machinist,* v. 91, April 24, 1947, p. 77-100.

Ten steps suggested are: identify and classify material; select surface speed; select cutter type and diameter; determine metal-removal rate of the workpiece; correlate metal-removal rate with horsepower available in the milling machine designated for the job; establish feed rate from the foregoing data; check tooth load; specify milling method (conventional or climb), holding method or fixture, chip disposal; establish cutter care and grinding procedure; and check surface and tolerance specifications and their influence on metal-removal rate.

20-204. Practical Ideas. *American Machinist,* v. 91, April 24, 1947, p. 111-116.

Direct-reading indicator measures concave or convex radii. Old saws make crush-form masters. Spring-shank chuck gives uniform feed. Hex-body collet chuck. Rubber-washer cutter. Deep facer dresses valve seats in place. Hints on small tools. Air cylinders improve milling machine fixture. Guide puts accuracy into plastic bushing production. Adjustable-centers roll drive maintains constant surface feed.

20-205. Screw Holes for Broach Inserts and Holders. *American Machinist,* v. 91, April 24, 1947, p. 139.

Standard for dimensioning screw holes and washers for broach inserts and holders. Permits the best heat treatment without the restriction of controlling location of holes because of growth.

20-206. The Devlieg Jigmil. *Automobile Engineer,* v. 37, March 1947, p. 98-100.

New machine for high precision boring and milling.

20-207. The Production of Gear Hobbing Machines. (Continued.) *Machinery (London),* v. 70, March 20, 1947, p. 281-286.

The work done in the machine shops and light fitting and assembly shops.

20-208. The Mechanism of Tool Vibration in the Cutting of Steel. Part II. *Machinery (London),* v. 70, March 20, 1947, p. 291-293; discussion, p. 294-295.

Relation between amplitude, cutting speed, tool frequency, and depth of cut; cutting interference.

20-209. Spline-Hobbing Fixture With Positive Angular Location. *Machinery (London),* v. 70, March 20, 1947, p. 295.

Simple fixture designed for holding shaft and pinion while hobbing the six splines on the shaft portion. The angular position of these splines in relation to the gear teeth is explained.

20-210. Fellows Gear-Shaper Setup for Cutting Ratchet Teeth. *Machinery (London),* v. 70, March 27, 1947, p. 313.

Component comprises a brass tube on to which is soldered a brass hub in the form of a machined stamping. The 14 ratchet teeth are cut on the hub after assembly, the operation being performed on a Fellows Type 7, high-speed gear shaper using a special work-holding fixture.

20-211. Large Capacity Hydroptic Jig Boring and Milling Machine. *Machinery (London),* v. 70, March 27, 1947, p. 322-324.

Various new features in large machine include measuring system for determining table and saddle settings, single-lever control of elevation and clamping, and a special table size and action.

20-212. The Broachability of Materials. Harry Gotberg. *Materials & Methods,* v. 25, April 1947, p. 103-107.

Effect of materials on broaching and broachability of steels in general; stainless steels; cast and malleable iron; brasses and bronzes; aluminum and magnesium; plastics.

20-213. Thrust Loads in Drilling. *Materials & Methods,* v. 25, April 1947, p. 147.

Tables for cast iron, machine steel, cast steel, and carbon steel.

20-214. A Handy Milling Fixture. Robert Mawson. *Materials & Methods,* v. 25, April 1947, p. 157.

Milling fixture simplifies the machining of a large quantity of small brass connectors.

20-215. High Porosity Grinding Wheels. G. B. Lurye. *Engineers' Digest (American Edition),* v. 4, April 1947, p. 191.

The various factors involved in the process of grinding, and steps recommended for improved results. (Abstracted from *Automobilnaya Promyshlennost,* Russia, no. 3, 1946, p. 12-15.)

20-216. Profiling Impeller Vanes. (Continued.) *Aircraft Production,* v. 9, April 1947, p. 153-156.

Cincinnati hydraulic profile-copying machine used in machining for gas turbines.

20-217. Largest Machine Tool Made on Coast. *Western Machinery and Steel World,* v. 38, April 1947, p. 94-95.

New lathe is manufactured in two sizes, a 20-in. lathe with 24 speeds and a 25-in. lathe with 16 speeds. Beds are of massive rigidity to give the fullest support to the rest of the lathe assembly while maintaining perfect alignment under any strain and stress of heavy-duty cutting.

20-218. Turning Noncircular Shapes. R. H. P. Nott. *Machinery (London),* v. 70, April 3, 1947, p. 345-347.

Complex machine designs which enable noncircular shapes to be produced by turning. The top rake of the tool relative to the work is maintained constant.

20-219. Internal-Threading Toolpost. *Engineering,* v. 163, April 4, 1947, p. 264.
Device for cutting internal threads with a single-point lathe tool characterized by a device which automatically withdraws the tool from the cutting position as soon as the desired number of threads has been cut.

20-220. 4-In. Hydraulic Grinding Machine. *Engineering,* v. 163, April 11, 1947, p. 283-284.
Details of the construction of a machine made by a British firm.

20-221. How to Use Carbide Cutters for Milling. Part X. H. A. Frommelt. *Iron Age,* v. 159, April 24, 1947, p. 58-62.
Factors in establishing good practice for milling operations, including attention to economical cutter life, acceptable surface finish, and adherence to specified dimensional accuracy, as well as the selection of the proper type of machine, holding and handling of the workpiece and grinding the cutter.

20-222. One Way to Produce a Cam. Robert Mawson. *Steel,* v. 120, April 28, 1947, p. 108, 136.
Methods used at John O. Pelchat Sawing Service, Providence, R. I. Illustrates one type of cam.

20-223. Production With Light Machine Tools. Part I. John E. Hyler. *Modern Machine Shop,* v. 19, May 1947, p. 124-130, 132.
Special tools and attachments indicate the possibilities of meeting production schedules with a minimum investment in equipment.

20-224. Finishing Fuel Injection Nozzle. Paul Grobey. *Modern Machine Shop,* v. 19, May 1947, p. 148-150, 152, 154.
A new method of finishing small injection nozzles on a production basis to extremely close limits of accuracy.

20-225. Ideas From Readers. *Modern Machine Shop,* v. 19, May 1947, p. 188-190, 192, 194, 196, 198, 200, 202.
Removing broken tools by blasting. Increasing production by cooperation. Safety suggestion. Extension cord brackets keep aisles clear. Electric limit switch saves cutters. Gages insure accurately ground tools.

20-226. Basic Components Underlie Machine Electrification Program. *Electrical Manufacturing,* v. 39, May 1947, p. 78-82, 158-162, 164, 166.
Monarch Machine Tool Co.'s latest types of machine tools, emphasizing electrical features.

20-227. Lear Solves Short Run Problem for Electro-Mechanical Accessories. Joseph Geschelin. *Automotive and Aviation Industries,* v. 96, May 1, 1947, p. 40-41, 82, 84.
How combinations of standard units, changes in gear ratio, variations in motor size, and the addition of special accessories make possible an endless chain of control devices adaptable to applications of amazing variety.

20-228. How to Use Carbide Cutters for Milling. Part XI. H. A. Frommelt. *Iron Age,* v. 159, May 8, 1947, p. 75-79.
Tool grinding and reconditioning; selecting a solvent; blade setting. Simple and effective method whereby tools can be ground to the desired angles without the use of costly equipment or highly skilled operations.

20-229. Shaving Applied to Marine Gears. *Iron Age,* v. 159, May 8, 1947, p. 86.
Westinghouse engineers obtain full face contact without recourse to lapping or other finishing methods. Hobbing feeds and speeds have been increased as much as 50% without sacrifice of accuracy but with a somewhat rougher surface that can be corrected by shaving. Resulting shaved-tooth surface has about twice as fine a finish as the best hobbed surface even at slow hobbing speeds.

20-230. Shop Shots. *American Machinist,* v. 91, May 8, 1947, p. 106-107.
How triple-purpose gage checks armature-shaft diameter and width and position of the Woodruff keyway with relation to shaft end and shaft axis; how spring-eyes are machine formed; cams level shop load; projections locate and hold.

20-231. Magazine Loading Speeds Second-Operation Work. W. L. Woodcock. *American Machinist,* v. 91, May 8, 1947, p. 108-110.
Magazine loader for second-operation work on B. & S. automatics built up of sheet metal and a metal block. Two runners on the bottom of the tray allow easy rolling of the gravity-fed pieces. Operating sequence and machine modifications.

20-232. Modern Tooling Steps up Buick Quality. Rupert Le Grand. *American Machinist,* v. 91, May 8, 1947, p. 114-116.
Details of new setups, placing emphasis on fixtures that can be loaded and unloaded easily in the retooling done for two parts, the oil-pump body and the exhaust-manifold valve body.

20-233. How to Specify Machine Tools for Carbides. Part I. H. A. Frommelt. *American Machinist,* v. 91, May 8, 1947, p. 134-137.
Various applications of carbide milling cutters, their increased efficiencies

and their relation to the problem of machine-tool specifications and purchase.

20-234. Hydraulics Modernizes an Old Planer. L. C. Beatty. *American Machinist,* v. 91, May 8, 1947, p. 141.

How greater production is possible by cutting reversing and return-stroke time, even without large increases in cutting speeds.

20-235. Practical Ideas. *American Machinist,* v. 91, May 8, 1947, p. 143-148.

Fundamental analysis gives four methods for finding groove radii. Wedge-base V-block levels work easily. Auxiliary bar adjusts turret-boring tool. Drill press speeds nut removal. Adjustable-length gage has many uses. Dust collector for metallizing operations. Supported bar bores small deep holes. Spindle-reversal doubles production. Parallel locating blocks aid rotary table setups. Lathe carriage becomes hand shaper. Cam lock grinding dog.

20-236. Standard Keyway Broaches. *American Machinist,* v. 91, May 8, 1947, p. 171.

Standard dimensions for broaches to cut standard keyways.

20-237. Overhaul of Underground Rolling Stock. *Machinery (London),* v. 70, April 17, 1947, p. 393-398.

Typical machine-shop operations at the Acton Works of the London Passenger Transport Board.

20-238. The Hobbing Process for Mold Production. *Machinery (London),* v. 70, April 17, 1947, p. 402-404.

Process consists of forcing a hardened steel master of extreme density into a soft steel blank, the external dimensions of which are subsequently machined to size. Typical press for the production of multiple-impression molds.

20-239. Diesel Engine Production. *Machinery (London),* v. 70, April 24, 1947, p. 421-427.

Machining operations on various components.

20-240. Calculations for the Manufacture of Milling Cutters. K. G. Molnar. *Machinery (London),* v. 70, April 24, 1947, p. 428-431.

The basic principles, formulas, and calculations essential for correct setup.

20-241. An Improved Method of Securing Ejectors in Die-Casting Dies. H. K. Barton. *Machinery (London),* v. 70, April 24, 1947, p. 435-436.

New means of securing ejector rods entails the use of a specially designed circular clip, which is located in a narrow groove at a short distance from the rear end of the ejector. Application of such a clip to an ejector formed from a straight length of stock rod.

20-242. Operation of an Engine Lathe. *Machine and Tool Blue Book,* v. 43, May 1947, p. 137-140, 142-145.

Parts of a lathe that hold the tool and control its movement, or rate of feed.

20-243. Broaching Helical Splines in Blind Holes. C. W. Hinman. *Machine and Tool Blue Book,* v. 43, May 1947, p. 177-178, 180, 182, 184, 186.

How to broach 18 helical splines without the broaching cutter passing through the work. A few fundamentals of broaching.

20-244. Modern Centerless Grinding Practice. Part IV. D. E. Lower. *Machine and Tool Blue Book,* v. 43, May 1947, p. 231-238, 240, 242.

The various faults of surface quality, shape and dimensions that are likely to show up in centerless grinding by both the throughfeed and infeed methods. Causes that may be behind each fault.

20-245. Multiple-Spindle Automatics Speedup Dodge Piston Production. Charles H. Wick. *Machinery,* v. 53, May 1947, p. 154-160.

Unusual tooling on multiple-spindle, automatic chucking machines, and drilling and boring machines used in rapidly finishing aluminum alloy pistons.

20-246. Accurate Holes With 0.6 Micro-Inch Finish Ground in One Setup. Charles H. Wick. *Machinery,* v. 53, May 1947, p. 162-166.

Methods employed and equipment required in grinding holes to within ten-millionths inch for both roundness and straightness, and to finishes of less than 1 micro-inch root-mean-square.

20-247. Precision Boring of Cylinder Blocks on an Automatic Transfer Machine. *Machinery,* v. 53, May 1947, p. 171-173.

Machine semifinishes and finish-bores the camshaft and crankshaft bearing diameters, finish-straddle-mills the center main bearing, and finishes the V-shaped oil and cork grooves. The cycle is entirely automatic.

20-248. Tool Engineering Ideas. *Machinery,* v. 53, May 1947, p. 181-183.

Automatic burring of grooved and drilled cylindrical parts. High-production die for forming fine wires into ring-shaped parts. Contour-turning a bronze engine part by the use of a master form.

20-249. Machinery's Data Sheets 585 and 586. *Machinery,* v. 53, May 1947, p. 233.

Tables for use in checking internal gear sizes by measurement between wires.

20-250. Transfer Type Machine Trebles Production Rate. J. J. Smiley. *Production Engineering & Management,* v. 19, May 1947, p. 61-62.

Transfer type line-production machine has made obsolete 11 machine setups formerly required for the precision processing of differential carrier castings. Production has increased to 300 units per shift as compared to 94 per shift which were obtained on the 11 separate setups.

20-251. Carbides on Railroad Jobs. Part II. Carroll Edgar. *Railway Mechanical Engineer,* v. 121, May 1947, p. 242-245.

Applications of carbide tools in the railroad machine shop.

20-252. X-Ray Diffraction as a Gage for Measuring Cold Work Produced in Milling. F. Zankl, A. G. Barkow, and A. O. Schmidt. *Transactions of the American Society of Mechanical Engineers,* v. 69, May 1947, p. 307-317; discussion, p. 317-318.

An X-ray diffraction analysis established the fact that the cold work produced in the workpiece was effected by the radial-rake angle of the milling cutter. A milling cutter with a negative radial-rake angle required more power than a cutter with a positive radial-rake angle. Study also revealed that the negative radial-rake angle cutter produced a more intense and deeper cold work in the workpiece, both in the case of two magnesium alloys and in S.A.E. 1020 steel.

20-253. Surface Finish of Steel in Face Milling. A. O. Schmidt. *Transactions of the American Society of Mechanical Engineers,* v. 69, May 1947, p. 325-328; discussion, p. 328-329.

Tests show that quality of surface finish in face milling is determined less by the radial-rake angle than by the cutting speed and feed per tooth; at the same cutting speed and feed, the surface finish, as measured by a profilometer, is approximately the same for both negative and positive radial-rake angles; the higher the cutting speed and the finer the feed, the better the surface finish. However, at too fine a feed and too high a cutting speed the cutter will wear rapidly; heavy feeds and slow cutting speeds will result in poorer surface finish.

20-254. How to Use Carbide Cutters for Milling. Part XII. H. A. Frommelt. *Iron Age,* v. 159, May 15, 1947, p. 62-65.

Necessity for complete educational program starting with top management and continuing through the ranks to the actual operators, including both classroom theory and practical demonstration on work regularly handled in production, when converting from conventional tooling to carbides. (To be continued.)

20-255. Automatic Size Control of Automotive Cylinder Bores. *Iron Age,* v. 159, May 15, 1947, p. 66.

A honing machine equipped with a Micromatic Hydro-size six-spline head and tools and fixtures to eliminate or materially reduce selective fitting of pistons in automotive cylinder bores. In a honing cycle of 30 sec., equipment removes an average of 0.004 in. of stock from each of the six bores, corrects out-of-roundness and taper, and holds bore-to-bore size to not over a 0.0005-in. variation.

20-256. Profile Machining. N. J. Cooke. *Engineering,* v. 183, April 18, 1947, p. 342.

Profile machining operations in the repetition production of large numbers of small to medium parts on capstan lathes and automatics. (Condensed from paper presented to the Institution of Production Engineers, North-Eastern Section, Jan. 20, 1947.)

20-257. Crosleys on the Production Line. Joseph Geschelin. *Automotive and Aviation Industries,* v. 96, May 15, 1947, p. 28-32, 74, 76.

Latest tooling and assembly methods. Operating sequence and equipment for crankcase and cylinder-block machining.

20-258. Unusual Machining Flexibility Permits Production of Engines of Different Sizes and Types. *Automotive and Aviation Industries,* v. 96, May 15, 1947, p 39, 64.

How fixtures are adapted to handle blocks of different sizes and types at Buda Co.

20-259. Hardness Distribution in Chips and Machined Surfaces. Norman Zlatin and M. Eugene Merchant. *Iron Age,* v. 159, May 22, 1947, p. 69-75.

Experimental work showed that the hardness of steel may be increased as much as 300% during the machining process, which fact has important bearing on the life of cutting tools and the serviceability of the machined surfaces. A method is given whereby the hardening produced by cutting can be predicted from the workhardening properties of the metal. The usefulness of microhardness tests as an aid in the study of machinability.

20-260. How to Use Carbide Cutters for Milling. Part XIII. H. A. Frommelt. *Iron Age,* v. 159, May 22, 1947, p. 77-79.

How to select the correct feed rates for the 11 major groups of materials, and how to select the most suitable size of cutter.

20-261. Composition, Control and Selection of Coolants for Working Metals. E. L. H. Bastian. *Steel,* v. 120, May 26, 1947, p. 94-95. 107-108, 112.

Selection of coolants for various operations including rolling, drawing, and grinding.

20-262. Manufacture, Selection and Use of Files. L. E. Browne. *Steel*, v. 120, May 26, 1947, p. 96-98, 132, 134, 136.

Best procedures for filing die castings, saws, extra-soft materials, and for precision work. (Concluded.)

20-263. Knight-Case Investigation on Lapping. *Industrial Diamond Review*, v. 7, April 1947, p. 102-104.

Work done by Knight and Case, originally published in 1915.

20-264. Grinder for Small Twist Drills. H. Long. *Industrial Diamond Review*, v. 7, April 1947, p. 112-113.

Machine developed by an instrument manufacturer for his own use.

20-265. Diamond Splinters for Truing. *Industrial Diamond Review*, v. 7, April 1947, p. 116.

How diamond chips mounted in soft brass, copper, or light metal were used for grinding thread gages since 1937 in Germany. (Translated from *Werkstattstechnik & Werksleiter*, v. 36, 1942, p. 470.)

20-266. Chipless Cutting of Metal? *Industrial Diamond Review*, v. 7, April 1947, p. 116.

Accomplishments in Germany. The chips are said to entirely burn up during the cutting operation, in which tungsten carbide and extremely high surface speeds are used.

20-267. Optimum Surface Finish With Sintered Carbide Tools. R. Gottschald. *Industrial Diamond Review*, v. 7, April 1947, p. 122.

Surface finishes and methods of evaluating them. Results of experimental work in which surface finish obtained in machining of steel is correlated with the different operating factors involved. (Translated and abstracted from Doctorate Thesis, Technical High School, Dresden, 1942.)

20-268. Friction Cutting Stainless. H. J. Chamberland. *Western Metals*, v. 5, May 1947, p. 28-30.

Techniques with table of saw velocities and pitches for various types and thicknesses of steel.

20-269. Automotive Cylinder Bore Size Automatically Controlled. *Steel*, v. 120, May 19, 1947, p. 96, 99.

A honing machine is equipped with a 6-spindle head, tools and fixtures. In a honing cycle of 30 sec., equipment removes an average of 0.004 in. of stock from each of the six bores, corrects out-of-roundness and taper, and holds bore-to-bore size within a limit of 0.0005 in.

20-270. Air Scanning Simplifies Irregular Contour Work. *Steel*, v. 120, May 19, 1947, p. 114.

New contour device provides accurate sizing, automatically, in turning, boring and facing of irregular-contour work. Matches the master templet within a limit of tenths.

20-271. Engineering Shop Notes. *Materials & Methods*, v. 25, May 1947, p. 132-133.

Mechanical handling of gear blanks speeds production. A simple quick-acting drill jig. Three-dimensional layout and inspection of castings.

20-272. Recent Developments in Crush Grinding Thread and Annular Forms. C. J. Linxweiler. *Tool Engineer*, v. 18, May 1947, p. 27-32.

Advantages of crush grinding for production of complex contours. Details of the Sheffield thread and form grinder. Annular-form crush grinding for the manufacture of circular form tools; production of annular forms; limits of application; choice of coolants; improvement of wheel specifications; crusher roll materials; effect of gashes on crusher life.

20-273. Drilling and Boring Tools. No. 10. *Tool Engineer*, v. 18, May 1947, p. 45-46.

Precision boring and hole finishing. (To be continued.)

20-274. Gadgets. *Tool Engineer*, v. 18, May 1947, p. 65.

Cut-off for hoppers which feed screws or rivets to drilling machines or punch presses, and a plastic drill jig for short production runs.

20-275. Bores Ground to Half A Millionth. E. J. Tangerman. *American Machinist*, v. 91, May 22, 1947, p. 93-95.

How precision to 0.000005 in. and smoothness to 0.0000005 in. have been obtained in internal grinding without lapping and honing.

20-276. Reduced Wear on the Way. *American Machinist*, v. 91, May 22, 1947, p. 96.

Fabric-reinforced phenolic sheet provides low-friction planer ways for loading to 50 psi. and speeds to 400 ft. per min.

20-277. Single-Cycle Tapping Reduces Breakage. Ed Anderson. *American Machinist*, v. 91, May 22, 1947, p. 105-106.

Rack-and-gear method is basis for high-production tapping on punch presses on straight-line power such as an air cylinder.

20-278. Some Face-Milling Observations. A. O. Schmidt. *American Machinist*, v. 91, May 22, 1947, p. 106.

Research on high speed indicates effectiveness of cutters with inserted cemented-carbide blades at positive radial-rake angles provided at the cutting edge with a negative radial-rake angle 1½ times the width of feed per tooth.

20-279. How to Specify Machine Tools for Carbides. Part II. H. A. Frommelt.

American Machinist, v. 91, May 22, 1947, p. 108-109.
How greater efficiency can be obtained through use of proper design considerations. (To be continued.)

20-280. Practical Ideas. *American Machinist,* v. 91, May 22, 1947, p. 131-136.
Precision taper measurement with micrometer calipers. Internal taper measurement. Pneumatic drill and mill run on lathe turret. Inserted-bit milling cutter. Offset straps. Piloted countersink. Collar keeps record of boring-tool settings. Wooden base positions milling attachments. Split-barrel wrench does difficult job. T-handle.

20-281. Electric Range Production. *Western Machinery and Steel World,* v. 38, May 1947, p. 86-89.
Equipment and procedures employed.

20-282. Special Jig Grinder. Raymond O. Catland. *Western Machinery and Steel World,* v. 38, May 1947, p. 98-99, 119.
Machine grinds straight holes, tapered holes in either direction, or contour grinds, blending of radii or the blending of straight with curved surfaces. Exceptionally useful in making dies, particularly of the injection-molding type. Distortion of tools, due to heat treatment, can be corrected with ease. It is unnecessary to locate holes with precision before heat treatment because dimensional accuracy can be had by grinding after hardening.

20-283. Job-Engineered Equipment. *Western Machinery and Steel World,* v. 38, May 1947, p. 104-107.
Machines designed and produced by West Coast manufacturer.

20-284. Machining Diesel Engine Components. *Machinery (London),* v. 70, May 8, 1947, p. 477-482.
Practice of the Turner Manufacturing Co., Ltd., for machining cylinder, crankshaft, and flywheel.

20-285. Developments in Honing Practice. *Machinery (London),* v. 70, May 8, 1947, p. 483-485.
Advances made in the technique of honing both during and since the war, and the machines and tooling equipment developed by the Micromatic Hone Corp., Detroit.

20-286. Accuracy Requirements for Heavy Machine Tools. J. H. Rivers. *Machinery (London),* v. 70, May 8, 1947, p. 486-490.
Spindle-bearing design and cambering mechanism for roll grinding. (Abstract of paper read before the Institution of Production Engineers. To be continued.)

20-287. What the Machine Tool Show Means to Metalworking Executives. Guy Hubbard. *Steel,* v. 120, June 2, 1947, p. 98-100.
Brief report on signs and portents of the current wave of design activity in the realm of machine-shop practice.

20-288. A Fresh Approach to Machining Diesel Engine Parts. E. K. Morgan. *Steel,* v. 120, June 2, 1947, p. 106-108, 142-143.
Adaptability of horizontal machines for variety of operations.

20-289. How to Use Carbide Cutters for Milling. Part XIV. H. A. Frommelt. *Iron Age,* v. 159, June 5, 1947, p. 80-83.
Necessity for carefully analyzing the workpiece for its metal-removal possibilities. How the feed rate should be established for minimum operation time, and how chip loads should be checked before putting a job into production. Merits of climb milling.

20-290. Skoda Universal Lathes. Joseph Pic. *Engineers' Digest (American Edition),* v. 4, May 1947, p. 236-238.
Recent improvements in lathe construction. (Translated and condensed from *Strojnicky Obzor,* v. 26, Sept. 1946, p. 159-165.)

20-291. Internal Grinding. *Automobile Engineer,* v. 37, May 1947, p. 169-170.
Recent developments in Churchill (British-made) automatic-sizing machines.

20-292. Form Wheel Dressing. *Automobile Engineer,* v. 37, May 1947, p. 187-189.
Tests carried out by Jones and Lamson Machine Co. in the U. S. to determine the relative efficiencies of the two techniques. It is shown that although a crush-dressed wheel will produce more pieces before redressing is necessary, a diamond-dressed wheel will give a better finish and greater accuracy and a higher rate of stock removal.

20-293. Form Grinding. *Automobile Engineer,* v. 37, May 1947, p. 190.
An interesting automatic cycle on a centerless machine.

20-294. Report on Bristol Type 167. *Aircraft Production,* v. 9, May 1947, p. 167-174.
Spar assembly; machining the main longerons or supplementary booms; rib construction; and innerwing assembly.

20-295. Seafire Leading-Edge Skins. L. G. Burnard. *Aircraft Production,* v. 9, May 1947, p. 177-182.
The very comprehensive routing and drilling equipment for the finishing of the wing panels after the stretching operation.

20-296. Profiling Impeller Vanes. Part II. *Aircraft Production,* v. 9, May 1947, p. 183-188.
The intricate but effective hydraulic

servomechanism by which the machine translates the contours of a master pattern into the movements of cutters which simultaneously shape two stampings. The equally ingenious Keller machine used by de Havilland for the same purpose.

20-297. Concentric and Eccentric Machining With One Chucking of the Part. Maurice C. Ohl. *Screw Machine Engineering*, v. 8, May 1947, p. 38-40.

Technique employed.

20-298. Milling Corrugations on the Multiple Spindle Bar Machine. *Screw Machine Engineering*, v. 8, May 1947, p. 41-43, 46.

Details of the operation.

20-299. Graphic Method of Computing Swing Stop Clearances. T. C. Cairns. *Screw Machine Engineering*, v. 8, May 1947, p. 48-51.

Often, on a Brown & Sharpe automatic, after several valuable hours of preparation and tool setup time have been spent, it is discovered that not enough cam space has been allowed for clearance between the swing-stock stop and the first turret tool. How this may be avoided.

20-300. Stock Ends. *Screw Machine Engineering*, v. 8, May 1947, p. 65.

Turret adaptor. Stock-feeding technique. Use of a spring-loaded brass plunger to prevent damage to thin-walled parts when ejecting from the turret.

20-301. Autocar Installs Special Machine for Boring Crankcases. *Automotive and Aviation Industries*, v. 96, June 1, 1947, p. 42.

Machine and its operation.

20-302. How to Specify Machine Tools for Carbides. Part III. H. A. Frommelt. *American Machinist*, v. 91, June 5, 1947, p 120-123.

Power requirements, separate spindle drives, automatic feed changes, number and adjustment of spindles, flywheel effect and workhandling.

20-303. Practical Ideas. *American Machinist*, v. 91, June 5, 1947, p. 125-132.

Small index plate attachment doubles all hole combinations. Telescoping valve retracts when pressure is off. Eccentric-scriber tram. High-speed pin cutter. A tip on tube tapping. Split-bushing expanding mandrel has flexibility of application. Chisel withdraws pipe nipples. Dressing wheels for concave grinding with proper angles. Puller removes all bearings without damage. V-block and clamp unit speeds tapping jobs. Tailstock setup chases small screws. Poke your feed tubes out through the wall. Simple safety hook. Drillpress undercutting tool. Automatic ejector improves Rockwell hardness tester. Height gage sets planer and shaper tools. Automatic lathe dog has quick-acting lock.

20-304. Machining Jaguar Connecting Rods. *Machinery (London)*, v. 70, May 1, 1947, p. 452-456.

Techniques used on light-alloy rods at British firm.

20-305. Diameter and Linear Tolerances on Tapers. W. Richards. *Machinery (London)*, v. 70, May 15, 1947, p. 505-509.

Methods of gaging taper-fit assemblies.

20-306. Production of the Leytool Hand Drill. *Machinery (London)*, v. 70, May 15, 1947, p. 510-514.

Machine-shop operations in production of British-made tool.

20-307. Klingelnberg Leadscrew Play Compensating Device. *Machinery (London)*, v. 70, May 15, 1947, p. 514.

German device which enables one or both flanks of a worm thread to be ground during traverse of the work past the grinding wheel in both directions.

20-308. Measuring Lathe Spindle Speeds. *Machinery (London)*, v. 70, May 15, 1947, p. 516.

Simple methods use only a stop watch, or a 60-to-1 worm reduction gear, respectively.

20-309. Lens Grinding Principles Applied to the Machine Shop. J. A. T. Crump. *Machinery (London)*, v. 70, May 15, 1947, p. 517-518.

How to produce large spherical areas on moderate sized grinding wheels.

20-310. Turning. Part I. Guy Hubbard. *Steel*, v. 120, June 9, 1947, p. 74-75, 122.

Ways and means of cutting costs and increasing production through the use of modern machine tools.

20-311. Aircraft Engines of Tomorrow in Production Today. Part I. Charles H. Wick. *Machinery*, v. 53, June 1947, p. 138-145.

Some of the methods employed by the Allison Division of General Motors in producing engines. (To be continued.)

20-312. Cylinder Production for the "Wasp Major" Engine. T. J. Crowley and F. J. Carney. *Machinery*, v. 53, June 1947, p. 152-159.

Production methods of machining forged aluminum alloy cylinders at Pratt & Whitney Aircraft. Multiple-station transfer and special finning machines are featured.

20-313. Precision Machining and Heat Treating of Aircraft Engine Gears. Vallory H. Laughner. *Machinery*, v. 53, June 1947, p. 168-173.

Precautions taken by the Wright Aeronautical Corp. to eliminate inaccuracy and distortion during machining, heat treating, and casehardening of aircraft reduction gears.

20-314. Precision Building of Convair-240's for Low-Cost Maintenance. G. F. Gerhauser. *Machinery,* v. 53, June 1947, p. 180-184.

Tooling designed so that assemblies and parts are interchangeable. Planning of assembly and parts for each assembly.

20-315. Transfer Machine of Sectional Design. *Machinery,* v. 53, June 1947, p. 192-195.

How Baush Machine Tool Co. of Springfield, Mass., has sectionalized its transfer machine for machining automotive transmission cases, so that individual units are as independent as in the more conventional production lines.

20-316. Tool Engineering Ideas. *Machinery,* v. 53, June 1947, p. 203-205.

Self-centering reaming fixtures for spinning caps, by Robert Mawson. Simple device for radius or profile turning, by Donald Baker. Tool for aligning lathe tailstock with work in chuck, by H. Moore. Versatile work-holding device with adjustable clamping pressure, by Mark W. Purser.

20-317. Drilling. Guy Hubbard. *Steel,* v. 120, June 16, 1947, p. 88-89, 134.

The development of mass production of holes, and the role played therein by modern machine tools.

20-318. A Tooling Program for Forged Globe Valves. Part VIII. Carl F. Benner. *Tool & Die Journal,* v. 13, June 1947, p. 78-83, 138.

Machine-shop operations in manufacture of Parker offset globe valves. (To be continued.)

20-319. A Duplicator Must Duplicate. *Tool & Die Journal,* v. 13, June 1947, p. 84-85, 88-90.

A number of hydraulic duplicating attachments for machine tools, manufactured by the Turchan Follower Machine Co. of Detroit.

20-320. Dual Belt-Gear Drive Increases Lathe Adaptability. *Product Engineering,* v. 18, June 1947, p. 96.

Two separate driving mechanisms—gear drive and direct belt drive—provide 12 spindle speeds in low and carbide ranges.

20-321. Tap Support Increases Flute Grinder Accuracy. *Product Engineering,* v. 18, June 1947, p. 98.

Design details of machine tool for accurate grinding of small spiral-pointed taps.

20-322. Machine Tools. *Russian Technical Research News,* v. 1, no. 6, 1947, p. 24.

Studies of the wear of thread-cutting dies led to formulation of an equation connecting wear with tooth geometry. Optimum reamer dimensions and reamer breaking strengths. (Translated and abstracted from Stanki i Instrument, no. 7-8, 1946.)

20-323. The Centerless Grinding of Bicycle Components. *Machinery Lloyd,* v. 19, May 24, 1947, p. 95-96.

Grinding of axles, cones and hubs by a British-made centerless grinder.

20-324. Tooling "Short-Cuts" Speed Engine Production. Gilbert C. Close. *Modern Machine Shop,* v. 20, June 1947, p. 124-128, 130, 132.

Tools and methods used in the manufacture of McCulloch motors.

20-325. Production With Light Machine Tools. Part II. John E. Hyler. *Modern Machine Shop,* v. 20, June 1947, p. 134, 136, 138, 140, 142, 144, 146, 148, 150, 152.

Bench lathes and bench-lathe tooling; turrets, cross slides, and stops; types of collets and collet closers.

20-326. Ideas From Readers. *Modern Machine Shop,* v. 20, June 1947, p. 194, 196, 198.

An emergency "lathe", by Elton Sterrett. Drilling opposite holes, by L. Kasper. Handy stock cabinet, by R. A. Shaw.

20-327. Various Ways of Accurately Mounting Workpieces of Different Shapes and Sizes, to Permit Different Cutting Operations. *Machine and Tool Blue Book,* v. 43, June 1947, p. 174, 176, 178, 180, 182-184, 186, 188, 190.

The manner in which a workpiece should be mounted on a lathe for the most efficient production is determined by many factors, all of which must be taken into account—the size and shape of the workpiece, the nature of the operation to be performed, the area and location of the workpiece surface to be worked. These factors determine what type of mounting should be employed to accomplish the desired results.

20-328. Using Carbides in Metalworking. H. A. Frommelt. *Machine and Tool Blue Book,* v. 43, June 1947, p. 211-212, 214, 216, 218, 220, 222, 224, 226, 228, 230.

Use in milling flats on overarms, setting rates of milling, cutting and clearance angles, metal removal rate, types of milling, surface finishing.

20-329. Direction of Maximum Crystal Elongation During Metal Cutting. G. H. Townend. *Journal of Applied Physics,* v 18, May 1947, p. 489-490.

Points out error in paper by M. E. Merchant on mechanics of the metal cutting process. The expression connecting shear angle, rake angle, and maximum crystal elongation is shown to be incorrect, and a new expression is derived. This has been confirmed by Dr. Merchant, whose original paper appeared in v. 16, 1945, p. 267.

20-330. Correct Conical Truing on New Center Grinder. *Industrial Diamond Review,* v. 7, May 1947, p. 131.

Proper procedures using Swiss machine.

20-331. Can Appropriate Diamond Sizes Be Determined by Formulas? W. Jacobsohn. *Industrial Diamond Review,* v. 7, May 1947, p. 144-146.

The various factors together with a comparison of recommended grinding wheels for specific operations and materials.

20-332. Turning Railway Motor Commutators in Switzerland. P. Casal. *Industrial Diamond Review,* v. 7, May 1947, p. 147.

Procedures.

20-333. Fine Turning and Boring. *Industrial Diamond Review,* v. 7, May 1947, p. 151.

The development of the art on the continent. (Translated and condensed from *Technische Rundschau,* v. 39, March 14, 1947, p. 9.)

20-334. Machining Brass Tubes. *Industrial Diamond Review,* v. 7, May 1947, p. 153.

Procedure. (Translated from *Technische Rundschau,* v. 38, Nov. 22, 1946, p. 19.)

20-335. Two New Radial Grinding Heads. *Industrial Diamond Review,* v. 7, May 1947, p. 154.

Two British machine-tool attachments.

20-336. Notes on Jig Design. A. Ryding. *Machinery (London),* v. 70, May 29, 1947, p. 565-569.

General recommendations on this subject, together with several examples incorporating what are considered essential features of good design.

20-337. Precision Taper Turning on the Multiple Spindle Automatic. *Screw Machine Engineering,* v. 8, June 1947, p. 40-42.

Illustrated by blueprint-type diagrams.

20-338. A Very Useful Method of Tooling for High Volume Production. Lewis N. Stewart. *Screw Machine Engineering,* v. 8, June 1947, p. 46-50.

Techniques for tooling a high-volume part such as a simple set screw; also several practical and useful ideas on additional tooling designed to reduce wear on vital machine parts.

20-339. Piercing Operation Performed on the Automatic Screw Machine. *Screw Machine Engineering,* v. 8, June 1947, p. 51-54.

How it can be accomplished.

20-340. Highlights on Threading. H. F. Wieler and R. E. Bender. *Screw Machine Engineering,* v. 8, June 1947, p. 60-62.

Series on "threading technique" is designed to approach the subject from simple basic terms, progressing from the wrong to right methods of chaser grinding and part design.

20-341. Stock Ends. *Screw Machine Engineering,* v 8, June 1947, p. 65.

Stop adaptor, by John G. Ozga. Emergency left-hand drill, by Foster Marten. Internal chamfers, by Robert M. Stone.

20-342. Production of Hydraulic Equipment. Part II. *Aircraft Production,* v. 9, June 1947, p. 226-231.

Fixtures used in machining thin-walled and other work and highly accurate surface-finishing of small components at British firm.

20-343. Honing for Precision Stock Removal. A. C. Leuchtman. *Production Engineering & Management,* v. 19, June 1947, p. 60-64.

Its use on nonmetallic materials and on nonferrous metals.

20-344. Versatile Machines and Fixtures Reduce Down-Time for Setup. *Production Engineering & Management,* v. 19, June 1947, p. 66-74.

Improvements in production methods for manufacture of chains, conveyers, materials-handling and mechanical power-transmission machinery, at Link-Belt Co.'s two Philadelphia plants.

20-345. Higher Machine Speeds Require Better Tube Liners. Joseph T. Vinbury. *Production Engineering & Management,* v. 19, June 1947, p. 77.

How objectionable stock whipping on screw-machine bar reels can be eliminated with New Britain Machine Co.'s hour-glass spring-stock reel-tube liners.

20-346. Production Data Sheet. *Production Engineering & Management,* v. 19, June 1947, p. 81.

Thrust loads due to drilling various metals.

20-347. The Crib. *Production Engineering & Management,* v. 19, June 1947, p. 83.

Lathe roller rest, by Thomas E. Davies. Repairing drawing bar, by Edward Diskavich.

20-348. New Lathe Tool Promises Greater Savings. *Tool Engineer,* v. 18, June 1947, p. 44.

Ejector-type carbide tool described results in savings in tool cost of 600%.

20-349. Drilling and Boring Tools. Part XI. *Tool Engineer,* v. 18, June 1947, p. 45-46.

Procedures and equipment for boring precision holes.

20-350. Self-Tightening Threads. Edwin C. Austin. *Tool Engineer,* v. 18, June 1947, p. 47.

Method for making by using taps with plus or minus lead error of 0.002 to 0.003 in. per inch.

20-351. Grinding Wheel Dresser. D. E. McDonald. *Tool Engineer*, v. 18, June 1947, p. 47.
Simple and inexpensive fixture.

20-352. How to Use Carbide Cutters for Milling. H. A. Frommelt. *Iron Age*, v. 159, June 12, 1947, p. 65-68.
Establishment of cutting rates for carbide milling differs greatly from procedures used for conventional milling. A simple step-by-step procedure illustrated by means of two examples.

20-353. How to Use Carbide Cutters for Milling. H. A. Frommelt. *Iron Age*, v. 159, June 19, 1947, p. 77-80.
Three more examples from actual shop practice are analyzed in full detail, including a skinning operation on a large magnesium billet. The method of selecting the most suitable size of milling cutter; a larger diameter cutter does not necessarily reduce the milling time.

20-354. Snakes in the Glass. Ananias MacHinery. *American Machinist*, v. 91, June 19, 1947, p. 108.
Use of specialized honing technique for diesel injector nozzles requiring 0.004-in. jet holes. The same technique was also found useful for cleaning of small-bore tubes.

20-355. Tone Stylus Provides Precise Duplicating. H. L. Seekins. *American Machinist*, v. 91, June 19, 1947, p. 109-111.
Use of an audible pressure-signaling device or tone stylus for a manually operated, profile-duplicating, milling machine which cuts centrifugal impellers for aircraft turbosuperchargers and provides an audiocontrol means for fast duplication of contours.

20-356. Hairline Precision in Shaver Making. Walter Rudolph. *American Machinist*, v. 91, June 19, 1947, p. 120-121.
Machine-shop procedures in manufacture of electric-shaver heads.

20-357. Practical Ideas. *American Machinist*, v. 91, June 19, 1947, p. 151-156.
Automatic tension nut improves hacksawing, by D. E. McDonald. Lathe milling can be practical, by Roger Isetts. Plunger check valve simplifies glass renewal, by W. Richardson. How to cut a corner chamfer, by F. W. Brady. Ball turning attachment uses power feed, by George A. Giller. Expanding mandrel tightens in blind holes, by Dana J. Mulholland. Special tools speed piston ring production, by F. G. Forquer. Drill press attachment rebores small motor-end bells, by George Burnley. Lateral extension attachment mills deep internal keyways, by C. D. MacKinnon. Lathe drill holder speeds deep drilling, by H. Moore. Edge bender forms heavy bar stock, by Edward S. Barrows.

20-358. Boring. Guy Hubbard. *Steel*, v. 120, June 23, 1947, p. 98-100, 141.
For work ranging in diameter from a fraction of an inch up to 40 ft. as handled on a wide variety of modern machine tools.

20-359. High-Volume Production of Passenger Car Axles. Joseph Geschelin. *Automotive Industries*, v. 97, July 1, 1947, p. 34-35, 67, 76.
Heat treating, cleaning, welding, and machine-shop operations.

20-360. Machining Problems in Production of Industrial Timing Mechanisms. C. R. Horton. *Materials & Methods*, v. 25, June 1947, p. 69-71.
Production methods used at Macnick Co.

20-361. Terminal Island's Heavy Machine Tools. Gordon B. Ashmead. *Western Machinery and Steel World*, v. 38, June 1947, p. 94-97.
Navy Yard equipment.

20-362. Methods of Increasing Fatigue Strength of Gear Teeth. *Machinery (London)*, v. 70, June 5, 1947, p. 601-602.
Following the ordinary finishing operation which produces surface-finishing lines parallel to the teeth and at right angles to the direction of rotation and load, lapping at the roots was used to create lines running parallel to the direction of rotation and load. A further development was the use of shot-peening of the root area after heat treatment to relieve stresses in the area of maximum stress.

20-363. Grinding Fixture for Brass Bracket. *Machinery (London)*, v. 70, June 5, 1947, p. 603.

20-364. Nonmetallic Table Ways for Planing Machines. *Machinery Lloyd (Overseas Edition)*, v. 19, June 7, 1947, p. 88-89.
Use of laminated phenolic resin ways on machines being built by American firm.

20-365. A New Automatic Duplex Centering Machine. *Machinery Lloyd (Overseas Edition)*, v. 19, June 7, 1947, p. 97.
British-made machine tool.

20-366. The Scope Multipurpose Lathe. *Machinery Lloyd (Overseas Edition)*, v. 19, June 7, 1947, p. 98-100.
British-made machine tool.

20-367. Gage for Measuring Taper Per Inch. *Machinery (London)*, v. 70, June 12, 1947, p. 624.
Shown diagrammatically.

20-368. Reduction Gearing for the Barbazon I. *Machinery (London)*, v. 70, June 12, 1947, p. 625-627.
Production of a large internal-bevel gear in British factory.

20-369. Jig Grinding. W. Bonham. *Machinery (London),* v. 70, June 12, 1947, p. 628-631.

Equipment, methods, and applications. Working on the same principle as the jig borer for accurate location of the work, the jig grinder enables holes in hardened components to be ground and corrected to the same limits as are obtainable from the jig borer when working unhardened materials.

20-370. Accuracy Requirements for Heavy Machine Tools. J. H. Rivers. *Machinery (London),* v. 70, June 19, 1947, p. 654-656.

Propeller-boss boring; crankpin-turning machines; and railway-wheel lathes.

20-371. Device for Machining Holes at Accurate Centers. *Machinery (London),* v. 70, June 19, 1947, p. 657-658.

Patented device whereby accurately spaced holes can be machined in a workpiece, using an ordinary drilling machine.

20-372. Four-Way Duplicating Blocks. *Machinery (London),* v. 70, June 19, 1947, p. 658.

Technique for transferring a set of holes on four sides from one shaft to another.

20-373. The "Matrik" Work Locater. *Machinery Lloyd (Overseas Edition),* v. 19, June 21, 1947, p. 78-79.

Apparatus for speedy and accurate resetting of machine work for the finishing operation in cases where the work is roughed on one machine and finished on another.

20-374. A New Automatic Hob and Helical Spline Grinding Machine. *Machinery Lloyd (Overseas Edition),* v. 19, June 21, 1947, p. 95-96.

British-made machine.

20-375. Compressed Air Power Provides Close Tolerances for Reel Production. *Steel,* v. 120, June 30, 1947, p. 83.

Use of compressed air-operated tools for several operations in cutting the parts of fly and baitcasting reels and in fitting them together.

20-376. Surface Machining. Part IV. Guy Hubbard. *Steel,* v. 120, June 30, 1947, p. 64-65, 102, 104.

The origin and development of planers and shapers, and their importance today as basic types of modern machine tools.

20-377. Machining and Shearing Malleable Iron. Russell A. LaCombe. *Production Engineering & Management,* v. 20, July 1947, p. 56-59.

How shearing operation permits removal of gates from malleable-iron fittings 400% faster with reduced health hazards and less fatigue.

20-378. Lathe Attachment Reduces Set-up Time. *Production Engineering & Management,* v. 20, July 1947, p. 62.

Mechanism which guides the motion of the standard lathe cutting tool in strict conformity with a master templet of the finished piece.

20-379. Production Data Sheet. *Production Engineering & Management,* v. 20, July 1947, p. 81.

Recommended design of single-point, dovetail forms, and skiving tools for high speed cutting of brass on automatics.

20-380. The Crib. *Production Engineering & Management,* v. 20, July 1947, p. 83.

Dual grinding setup, by George W. Bruck. Repairing micrometers, by William Knoll.

20-381. Aircraft Engines of Tomorrow in Production Today. Charles H. Wick. *Machinery,* v. 53, July 1947, p. 136-139.

The practice of the Allison Division, General Motors Corp., in producing jet engines. Welding, machining, and grinding operations on the turbine-rotor wheel and buckets. (Concluded.)

20-382. Operations on Small High-Speed Automatic Turret Lathes. *Machinery,* v. 53, July 1947, p. 140-144.

Production data taken from typical shop operations on a variety of small aluminum and cast-iron parts.

20-383. Applying Light Drill Presses to High-Production Jobs. Charles Marti. *Machinery,* v. 53, July 1947, p. 146-150.

Ingenious tooling, quick-operating devices, and oil-bath cutting which permit over 100,000 parts per day to be turned, tapped, slotted, and threaded on ½-in. capacity drill presses.

20-384. Tool Engineering Ideas. *Machinery,* v. 53, July 1947, p. 181-183.

Quick-action boring fixture, by Donald A. Baker. Centerless grinder arranged for continuous and simultaneous work-feeding and wheel dressing, by Ernest Berger.

20-385. How to Use Carbide Cutters for Milling. H. A. Frommelt. *Iron Age,* v. 160, July 3, 1947, p. 69-72.

Step-by-step analysis clearly indicates value of face milling on the score of costs, finish and accuracy.

20-386. Carbides Hob Nonmetallic Gears. Leo W. Reuland. *American Machinist,* v. 91, July 3, 1947, p. 96-98.

Recent applications.

20-387. Punch Press Can Be Safe. W. A. Vollmer. *American Machinist,* v. 91, July 3, 1947, p. 99-103.

Enclosure-type guards for different jobs.

20-388. Practical Ideas. *American Machinist,* v. 91, July 3, 1947, p. 127-132.

Basic automatic chuck holds different parts, by F. Hartley. Spring Parallel, by Joseph Villiger. V-block, by F. J. Peragine. Chamfering, by Oscar Craft. Extension clamp, by Nicholas Rosmando. Long limit gage, by M. W. Bossman. Dovetail gaging blocks, by Benedict Benith. Sliding tray holds drawing instruments, by W. D. Chiverton. Converted caliper, by Walter J. Hoeckele. Adjustable V-blocks, by Edward J. Carey. Tailstock V-block helps position heavy work, by J. H. Quatkemeyer. Die sinking, by Cliff Bossmann. Telescoping gage measures large gate valve threads, by John Proctor. Anchored collet inserts, by John S. Curtiss. Blocked work and longitudinal feed cuts keyways in lathe, by Arthur Silvester. Repairing centers, by F. J. Peragine. Expanding extractor removes blind bushings, by Harry A. Livingston. Lathe taper attachment, by Donald A. Baker. Circle and straight line scriber, by L. Avril. Wheel dresser, by Arthur F. Hird. Steadyrest, by Edmund L. Johnson. Opaque guide and key seating tool, by Wallace E. Ryle. Scriber, by George Michaud.

20-389. **Production With Light Machine Tools. Part III.** John E. Hyler. *Modern Machine Shop,* v. 20, July 1947, p. 124-128, 130, 132, 134, 136.

Special applications of drilling equipment; bench shapers with special controls; automatic multiple-spindle tapping machine.

20-390. **Accurate Adjustment for Precision Lead Screws.** Roger W. Bolz. *Modern Machine Shop,* v. 20, July 1947, p 138-140, 142, 144.

Method for easily adjusting thread-miller lead screw, which suggests possibilities of adaptation to similar mechanisms.

20-391. **Ideas From Readers.** *Modern Machine Shop,* v. 20, July 1947, p. 198, 200, 202, 204, 206, 208, 210, 212.

Traveling seat for operator speeds drill press operations, by Walter Rudolph. Taking kinks out of pulleys, by Robert Mawson. Gadget for cutting circles with welding torch, by George Winthrop Perry. Fixture for welding broken drills, by A. W. Payne.

20-392. **Milling. Part V.** Guy Hubbard. *Steel,* v. 121, July 7, 1947, p. 90-92, 118.

American inventions in milling machines from Eli Whitney's original down to the most advanced modern machine tools.

20-393. **Hole Location Methods From Makeshift to Precision.** Frederick C. Victory. *Machine and Tool Blue Book,* v. 43, July 1947, p. 137-144, 146.

Jig borer and jig grinder provide an efficient locating method, eliminate the translation step, and provide ideal machining conditions. A comparison between the new hole-locating machine and old methods.

20-394. **Operation of an Engine Lathe.** *Machine and Tool Blue Book,* v. 43, July 1947, p. 151-152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172.

Practical instructions for various typical jobs. Clarified by excellent diagrams.

20-395. **How to Use Carbide Cutters for Milling. A Practical Conversion Problem.** H. A. Frommelt. *Iron Age,* v. 160, July 10, 1947, p. 66-68.

Taking as an example the frame of a 700-hp., electric motor composed of a cast-steel section welded to a boiler-plate weldment, in continuous production. The problem of converting to carbide-milling operations. Axle pads and chamfers, and savings possible by use of higher powered equipment. (To be continued.)

20-396. **Contour Sawing Practice as Related to Press Work.** H. J. Chamberland. *Tool & Die Journal,* v. 13, July 1947, p. 79-83, 148, 150.

Compares contour sawing with ordinary sawing and with flame cutting. Techniques for use of contour sawing in production of punches and dies for stamping. Tests also showed that, for production of thin sheet-metal parts, contour sawing was more economical than the thin-die method for runs under 500 parts, and more economical than production press work for lots as high as 2000 parts.

20-397. **Operators Solve Machine Modification Problems.** H. W. Lancaster. *American Machinist,* v. 91, July 17, 1947, p 112-113.

Irregular bores cut with tracing device. Extra stripper travel on multi-slide machine. Gasket cutter adjusts to fit new designs.

20-398. **Practical Ideas.** *American Machinist,* v. 91, July 17, 1947, p. 143-148.

Undulated bushing guides tool for chamfering elliptical holes, by Iser Herman. Simple lock clamps index plate between notches, by Fritz L. Keller. Two clamps simplify punch and die layouts, by Edward Diskavich. Offset jaw and limit snap gage-block gages, by Arthur J. Wormwood. Wedging eccentric clamps index plates tightly, by Lawrence Bastrup. Hole locater, by Ed. C. Grannell. Secondary vise jaw, by C. W. Pressey. Pin vise trammel, by Roscoe B. Boone. Drill jig air ejector, by A. F. Scoblic. Taper attachment improves vertical boring mill, by Charles Smithyman. Portable burring machine, by Harvey E. Essmann. Angle formulas, by Claes L. Hultgren. Identifying mandrels, by Thomas Trail.

20-399. Grinding. Guy Hubbard. *Steel,* v. 121, July 14, 1947, p. 81-82, 116.
History of precision grinding. Development of coolants. Advances in hole grinding.

20-400. How to Use Carbide Cutters for Milling; A Practical Conversion Problem. H. A. Frommelt. *Iron Age,* v. 160, July 17, 1947, p. 61-64.
Problems in conversion of a large motor frame to carbide milling; the factors involved in milling the clearance under the axle pads, cutting narrow slots, and facing window openings. Production figures show large increases.

20-401. Friction-Cutting Techniques. H. J. Chamberland. *Aero Digest,* v. 55, July 1947, p. 46-47, 94.
Methods used and applicability to various metals and alloys. Saw velocities and saw pitches for the materials best suited to the process.

20-402. Broaching. Guy Hubbard. *Steel,* v 121, July 21, 1947, p. 96-98, 128.
Chief developments in 100 years of broaching. Importance in the development of modern machine tools.

20-403. Two Jig Boring Machines. *Engineer,* v. 184, July 4, 1947, p. 15-16.
Two new Swiss machine tools.

20-404. How to Use Carbide Cutters for Milling. H. A. Frommelt. *Iron Age,* v. 160, July 24, 1947, p. 68-70.
Twentieth and final section consists of a brief resume of all the data given in detail in the preceding articles.

20-405. Automatic Repetition Work and the Manufacture of Precision Apparatus. André Daetwyler. *Microtecnic (English Section),* v. 1, Feb. 1947, p. 14-15.
A general article, prepared as an introduction to a series of articles on automatic lathe work. (Translated from the French.)

20-406. Le Tournage des Alliages Legers. (Machining of Light Alloys.) Rene Schweyckart. *Revue de l'Aluminium,* v. 24, Feb. 1947, p. 44-51.
The importance of high cutting speeds. Techniques for the different types of aluminum alloys. Chips and surfaces produced by different techniques.

20-407. Production Processes. Their Influence on Design. Part XXV. Precision Boring. Roger W. Bolz. *Machine Design,* v. 19, July 1947, p. 137-142.
Need for exact boring. Uses of bored pieces in modern machinery. How close tolerances are obtained.

20-408. Drilling and Boring Tools. Part 12. *Tool Engineer,* v. 18, July 1947, p. 47-48.
Design of a fixture for an engine or turret lathe for production of a specific job requiring close tolerance boring. (Concluded.)

20-409. Profile Turning Production of Small Repetition Parts by "Skiving". N. Cooke. *Aircraft Production,* v. 9, July 1947, p. 249-251.
A shaving method—termed "skiving" by wood-turners—which has been used with success in the production of aircraft turnbuckles.

20-410. Aircraft Brake Production. J. A. Oates. *Aircraft Production,* v. 9, July 1947, p. 270-274.
Specialized equipment for multiple drilling and slotting used by British firm.

20-411. Precision Boring. *Aircraft Production,* v. 9, July 1947, p. 275-276.
Accurate hole-location by triangulating device and gage slips.

20-412. V-Block for Odd-Shaped Punches. *Machinery (London),* v. 71, July 3, 1947, p. 11.
Diagram and description for use when grinding.

20-413. Berthiez-C. W. B. Boring and Milling Machine. *Machinery (London),* v. 71, July 3, 1947, p. 14-17.
Swiss produced machine suitable for boring, surfacing, horizontal and vertical milling, drilling, tapping, grinding, profile copying, and in-line boring at one setting of the workpiece.

20-414. The New Engraving Machine "M.S.A.". R. P. Guye. *Microtecnic (English Section),* v. 1, June 1947, p. 66-68.
Machine for marking tools and apparatus utilizing a pantograph. Either acid or an electric arc may be used. (Translated from the French. For illustrations, see *French Section,* p. 156-159.)

20-415. Improved Cold Set Sintered Carbide Tool. *Industrial Diamond Review,* v. 7, June 1947, p. 165.
A new type of sintered carbide tool for which several advantages are claimed.

20-416. New Oerlikon Carbide Grinder. *Industrial Diamond Review,* v. 7, June 1947, p. 175.
Hand-operated universal carbide grinder for the watch and precision industries which can be used with advantage on small tools and components, for precision grinding and polishing operations, such as cylindrical grinding, relief grinding, grinding chip breaker grooves, surface grinding, and sawing.

20-417. Report on the German Machine Tool Industry. *Industrial Diamond Review,* v. 7, June 1947, p. 178-180.
(Reprinted from B.I.O.S. Final Report, No. 641, Item No. 31.)

20-418. Moore Panto-Crush Wheel Truer. *Industrial Diamond Review,* v. 7, June 1947, p. 184.
Machine attachment which combines

diamond form wheel truing by pantograph and by roll crushing.

20-419. **What Is the Meaning of Generating Milling?** Ernest Widmer. *Microtecnic (English Section)*, v. 1, June 1947, p. 65-66.

The manufacture of toothed wheels by this method. (Translated from the German. For illustrations, see *French Section*, p. 152-155.)

20-420. **A New Line of New Britain Automatics.** *Screw Machine Engineering*, v. 8, July 1947, p. 56-61.

Descriptive.

20-421. **Designing Tools for Screw Machine Production. Part XI.** Roy M. Spaulding. *Screw Machine Engineering*, v. 8, July 1947, p. 62-63, 65, 67.

Recommended degrees of top rake for a wide variety of materials. How to calculate top rake for form tools only and for a combination of cutoff and form tools.

20-422. **Highlights on Threading. Part II.** H. F. Wieler and R. E. Bender. *Screw Machine Engineering*, v. 8, July 1947, p. 69-72.

A diagram of thread throat; how to grind the cutting face of a chaser, and the gun-tap grind. Design of insert chaser carriers. (To be continued.)

20-423. **Stock Ends.** *Screw Machine Engineering*, v. 8, July 1947, p. 75.

Burring gear teeth, by Robert M. Stone. Turret loaders, by Raymond J. Braski.

20-424. **A Quick Acting Drill Jig.** Robert Mawson. *Materials & Methods*, v. 26, July 1947, p. 134.

Has accuracy, simplicity and quick action.

20-425. **Three Methods of Tooling One Part.** *Screw Machine Engineering*, v. 8, July 1947, p. 44-49.

The actual steps followed in eliminating trouble and devising superior methods for production of a specific clock part. The first two methods described produced a cut thread on the part and were quite satisfactory. However, the third method, using roll threading, is definitely superior to the other two.

20-426. **Broaching Brasses and Bronzes.** Harry H. Gotberg. *Western Machinery and Steel World*, v. 38, July 1947, p. 93-95.

Principles of design and operation.

20-427. **Precision Tripods.** *Western Machinery and Steel World*, v. 38, July 1947, p. 98-99.

Production of above at DeYoung Bros. Machine Shop in Los Angeles.

20-428. **Temperature Control for Prototype Work.** *Western Machinery and Steel World*, v. 38, July 1947, p. 102-103, 119.

Use of controlled temperature room for jig boring and duplicating in order to provide precision to 0.0002 in.

20-429. **Millions of Parts a Month.** Louis Zila. *Western Machinery and Steel World*, v. 38, July 1947, p. 106-108.

Production of miscellaneous tiny parts used in calculating machines.

20-430. **Carboloy Tools Solve Problem of Resurfacing Workhardened Forging Anvil.** *Modern Industrial "Press"*, v. 9, July 1947, p. 46.

Resurfaced without removal from hammer.

20-431. **Fine Finish by Burnishing.** *Screw Machine Engineering*, v. 8, July 1947, p. 38-39, 41.

By application of roller burnishing, many jobs which formerly required secondary operations in order to meet finish specifications can be completed on the automatic screw machine. The use of high-speed drilling attachments, cross-hole drilling, and chamfering the cut-off end of a part.

20-432. **Optical Drill Chuck.** *Engineering*, v. 164, July 4, 1947, p. 8.

Drill chuck manufactured in Britain which has an optical system for exact location of the drill over the scribed cross marks at which the hole is to be drilled. Accuracy within 0.002 in. is claimed.

20-433. **Manufacture of Fuel-Injection Equipment.** *Engineering*, v. 164, July 4, 1947, p. 9-10, 12.

Apparatus and techniques used by British firms.

20-434. **Threading. Part VIII.** Guy Hubbard. *Steel*, v. 121, July 28, 1947, p. 76-78, 102, 104.

A few highlights on the development of screws and screw making. Techniques of today involve 25 varieties of modern machine tools.

20-435. **Micro-Inch Machine Setups.** H. J. Chamberland. *Steel*, v. 121, July 28, 1947, p. 79, 92.

The advantages of providing gage blocks to machine operators, in order to improve product quality. The usual objections to such a policy are discounted.

20-436. **Simultaneous Internal and External Threading of Bushings.** *Iron Age*, v 160, July 31, 1947, p. 49.

Some 1100 threaded parts per hour for shock absorbers, knee action and other assemblies are produced on a 10-spindle Allen multiple drill press.

20-437. **Modern Developments in Precision Boring Practice.** Carroll R. Alden. *Iron Age*, v. 160, July 31, 1947, p. 50-55.

Practical examples of single and multiple boring operations on both large and small parts.

20-438. Automatic Sizing Unit. *Iron Age,* v. 160, July 31, 1947, p. 61-62.
A standard engine or toolmaker's lathe can be converted from manual to automatic operation for such work as step shaft turning, boring, and contour turning, or any combination of these operations.

20-439. Tables for Use in Milling Cutter Calculations. K. G. Molnar. *Machinery (London),* v. 71, July 10, 1947, p. 39-42.
Use of tables; how the various values required for the formulas are obtained in ordinary shop practice.

20-440. Making Small Automatics. *Machinery (London),* v. 71, July 10, 1947, p. 43-45.
Operations in manufacture of machine tools by British firm.

20-441. Fixtures Make Disk Grinders Versatile. Fred C. Schaub. *American Machinist,* v. 91, July 31, 1947, p. 73-77.
Rapid finishing can be done on single and double-spindle units with properly designed fixtures.

20-442. Research Makes Milling Cutters Behave. Chester Ricker. *American Machinist,* v. 91, July 31, 1947, p. 83.
Review of paper presented by A. O. Schmidt at meeting of Detroit Section of A.S.T.E. Basic experimental work on materials and designs of cutting tools.

20-443. Piston Pins Centerless-Lapped to Tenths. John Nylen. *American Machinist,* v. 91, July 31, 1947, p. 84-87.
Six grinders and three lappers, tied together in a continuous line by chain conveyers, produce 1700 to 2600 replacement pins per hour to close tolerances.

20-444. Practical Ideas. *American Machinist,* v. 91, July 31, 1947, p. 107-112.
Rubber wheel cuts short springs, by C. E. Lambert. Micrometer layout tool gives greater accuracy, by Harry Fox. Space multiple threads without touching leadscrew, by Frank T. Lynch. Miking drills, by M. J. Curcio. Broach-iron solves micro-finish problem, by Dana J. Mulholland. Inclined internal fly cutter mills elliptical punches, by W. W. Brubaker. Floating center drill locates rod centers, by Harry F. Schick, Jr. Hinged drill socket saves tailstock feeding, by H. Moore. Cube aids grinding setups, by W. B. Hurt. Toolbit mockups insure uniform regrinds, by George Burnley. Screw cutting lathe graduates scales, by U. Wheatley. Universal V-block jig establishes hole centers, by Gerhard Wenke. Lightweight handwheel, by W. Heinemann. Fast multiple threading, by C. D. MacKinnon.

20-445. The M.S.E. Optical Drill Chuck. *Machinery Lloyd (Overseas Edition),* v. 19, July 5, 1947, p. 87.
New device combines a tool and a measuring instrument.

20-446. The Machining of Monel, Nickel and Inconel. *Machinery Lloyd (Overseas Edition),* v. 19, July 5, 1947, p. 88-89.
Design of tools and types of toolsteel required; cutting fluids; recommended practices.

20-447. The Application of Butt Welded Tools. *Edgar Allen News,* v. 26, July 1947, p. 861-863.
How Superweld high speed tools are made by Edgar Allen, Ltd. Results of destruction test. (To be continued.)

20-448. Designing and Using Drill Jigs. C W. Hinman. *Machine and Tool Blue Book,* v. 43, Aug. 1947, p. 137-142, 144.
Eight general types of commonly used drill jigs.

20-449. Increased Production by the Use of Speed Lathes. S. E. Wright. *Machine and Tool Blue Book,* v. 43, Aug. 1947, p. 147-148, 150-152.
A number of applications of the speed-lathe principle, such as revolving the part to be finished for polishing, deburring, grinding, lapping.

20-450. Centerless Thread Grinder. M. S. Ghesdahl. *Machine and Tool Blue Book,* v. 43, Aug. 1947, p. 155-156, 158, 160-161.
Technique produces, after heat treating, 15,000 to 20,000 finished screws in one day.

20-451. Using Carbides in Metalworking. H. A. Frommelt. *Machine and Tool Blue Book,* v. 43, Aug. 1947, p. 181-182, 184-188, 190.
Carbide milling S.A.E. 1020 cold rolled steel with a 1-hp. milling machine.

20-452. Tooling the Automatic Screw Machine. Part XIX. Noel Brindle. *Modern Machine Shop,* v. 20, Aug. 1947, p 108-112, 114, 116, 118, 120, 122, 124, 126.
A comparison of various makes of automatic screw machines.

20-453. The Flaming Saw. Waldo C. Wright. *Modern Machine Shop,* v. 20, Aug. 1947, p. 142, 144, 146, 148, 150.
Use of rapidly moving, dull-blade bandsaw to cut metals by melting rather than cutting.

20-454. Ideas From Readers. *Modern Machine Shop,* v. 20, Aug. 1947, p. 182, 184, 189-190, 192, 194.
Marking off tube joints, by E. R. Yarham. Saving time on steam line repairs, by Herbert Thayer Bruce. Air-operated clamps on milling fixture, by J. Earl Spellman. Stapling better than stitching for buffs, by A. H. Waychoff.

20-455. Mechanisms of Metal Cutting. W. H. Oldacre and H. A. Erickson.

Mechanical Engineering, v. 69, Aug. 1947, p. 655-657.
Chip contours provide information concerning the process of chip formation.

20-456. Cutting-Off. Guy Hubbard. *Steel*, v. 121, Aug. 4, 1947, p. 92-94, 128.
Trend toward automaticity in production cutting-off operations by use of power hack saws, band saws, and circular saws.

20-457. Indexing Drill Jig. Robert Mawson. *Steel*, v. 121, Aug. 4, 1947, p. 95.
Several interesting features incorporated in a drill jig designed to machine holes in electrical housings.

20-458. Production Drilling With a Universal Machine. *Iron Age*, v. 160, Aug. 7, 1947, p. 66.
New machine tool setup.

20-459. High-Speed Photos Show Cutting Tool Breaking. *Iron Age*, v. 160, Aug. 7, 1947, p. 84.
What happens when a fly cutter on a milling machine is broken by overloading through increasing the rate of feed beyond that prescribed for the work.

20-460. Gear Making. Guy Hubbard. *Steel*, v. 121, Aug. 11, 1947, p. 80-82, 90.
The history of the development of the gear industry.

20-461. Effects of Grinding on Physical Properties of Hardened Steel Parts. H. E. Boyer. *American Society for Metals Preprint No. 23*, 1947. (To be published in *Transactions* for 1948.)
A study of the unbalanced residual stresses induced by grinding of highly hardened steel parts and the ultimate effect of such stresses upon physical properties. Hardened S.A.E. 52100 steel was used although the findings may be applied to other steels of the deep-hardening type. Fatigue and other physical properties are seriously affected by incorrect planning of grinding operations.

20-462. A New Method of Metal Cutting. *Engineers' Digest (American Edition)*, v. 4, July 1947, p. 303.
The new process developed in Russia is based on a combination of electrolytic and spark action. Advantages are freedom from dependence on hardness of the metal being cut, ability to cut hardened parts without loss of hardness, increased accuracy of cutting because of small heat release, ability to cut sintered compacts, and machining and cutting of parts of various shapes used in gas-turbine construction.

20-463. Electro-Erosion Cutting of Hard Metal and Steel. T. P. Rekshinskaya. *Engineers' Digest (American Edition)*, v. 4, July 1947, p. 304-305.
Experimental investigation of process at the Gorki Automobile Works used for cutting all types of hard metal of any sections used at present in the motor industry, hardened steels and other very hard metals provided the sectional area does not exceed 16 sq. cm., and bar stock provided the sectional area is not in excess of 5 sq. cm. (Translated and condensed from *Automobilnaya Promishlenost*, no. 5-6, 1946, p. 12-15.)

20-464. Measuring in the Workshop. P. Leinweber. *Engineers' Digest (American Edition)*, v. 4, July 1947, p. 335-338.
The problem of restarting factory production without the benefits of modern machine tools and measuring equipment, as is necessary in Germany today. (Translated and condensed from *Die Technik*, v. 2, Jan. 1947, p. 1-6.)

20-465. Bicycle Production. *Machinery (London)*, v. 71, July 17, 1947, p. 59-65.
Methods employed in the tube and machine shops at the Raleigh Works for frame assembly.

20-466. Graphs for Use in Milling Cutter Calculations. K. G. Molnar. *Machinery (London)*, v. 71, July 17, 1947, p. 66-72.
Supplement to data given in July 10, 1947 issue.

20-467. Two Swiss Machine Tools. *Engineer*, v. 184, July 18, 1947, p. 64.
Milling cutter milling machine and hydraulic broaching machine.

20-468. A Milling Cutter Grinder. *Engineer*, v. 184, July 18, 1947, p. 64-65.
Swiss machine.

20-469. A New High-Speed Center Lathe. *Machinery Lloyd (Overseas Edition)*, v. 19, July 19, 1947, p. 82-83.
Description and application.

20-470. A Tooling Program for Forged Globe Valves. Part IX. Carl F. Benner. *Tool & Die Journal*, v. 13, Aug. 1947, p. 53-58.
Four sets of operations: reducing the stem rod by turning, followed by thread cutting, chamfering, and facing; cutting a hexagonal shape on the stem for attachment of the handle; making the "jam nut" for holding the handle on the stem; and drilling and burring the hole through the handle. (To be concluded.)

20-471. Midget Mills for Die and Sheet Metal Finishing. *Tool & Die Journal*, v. 13, Aug. 1947, p. 59-60, 64, 109.
Mills made by Severance Tool Industries, Inc., Saginaw, Mich., for making dies, deburring, and other operations on stamped and sheet metal parts.

20-472. Tooling Methods for Working Magnesium. James V. Winkler. *Tool Engineer,* v. 19, Aug. 1947, p. 17-20.

A general discussion with some remarks on the properties, uses and advantages of magnesium.

20-473. Grinding Spur and Helical Gear Teeth. John C. Dixon. *Tool Engineer,* v. 19, Aug. 1947, p. 21-28.

Progress from ancient times, with an emphasis on present-day gear grinding methods and machines.

20-474. Grinding Wheels Developed for Wide Application. *Machinery,* v. 53, Aug. 1947, p. 156-157.

New line of grinding wheels with a vitrified bond that offers a minimum amount of interference to the cutting action of abrasive.

20-475. Modern Methods of Cutting Truck Transmission Gears. *Machinery,* v. 53, Aug. 1947, p. 160-162.

Cutting of truck transmission gears by three different methods and finishing on two types of shaving machines. Simultaneous shaving of two gears increases production.

20-476. Ingenious Mechanisms. *Machinery,* v. 53, Aug. 1947, p. 163-165.

Follower mechanism for contour milling of grooves, by Charles E. Lambert. Mechanism for operating dial feed and radially positioned multiple punches, by Charles F. Smith.

20-477. Tool Engineering Ideas. *Machinery,* v. 53, Aug. 1947, p. 167-169.

Modified lathe setup for continuous threading of bar stock, by Mark W. Purser. Multiple belt drive with thrust equalizing arrangement, by Martin H. Ball. Milling threads on valve stems, by E. N. Olson.

20-478. Specific Studies Pertaining to Tool Wear, Chip Characteristics, and Surface Finish of Free-Cutting Steels. G. P. Witteman. *Transactions of the A.S.M.E.,* v. 69, Aug. 1947, p. 643-656.

How increases in hardening elements will affect machinability. Studies of chip sizes and characteristics give information on machining properties and tool wear. Microhardness tests are used to study metallurgical differences and the effect of elements such as nitrogen and boron on the various constituents of the steel.

20-479. Effect of Varying Relief Angles When Face-Milling Cast Iron With Sintered-Carbide-Tipped Cutters. O. W. Boston and W. W. Gilbert. *Transactions of the A.S.M.E.,* v. 69, Aug. 1947, p. 657-663; discussion, p. 663.

Tests to determine tool wear, tool life, and power consumption when varying the relief angles on 0° and 45° peripheral-cutting-edge-angle face-milling cutters.

20-480. Effect of Microstructure on Machinability of Cast Irons. Parts I and II. Michael Field and E. E. Stansbury. *Transactions of the A.S.M.E.,* v. 69, Aug. 1947, p. 665-673; p. 675-682.

Test bars prepared to study the effect of the following structures in the milling of cast iron: graphite-pearlite of various gradations of coarseness; graphite-pearlite plus about 5% of free-carbide segregation; graphite-ferrite. Quantitative results of the relative machinability of these structures are presented in terms of tool life, power requirements, surface finish. Tool life, power requirements, and surface finish are determined for straight malleable iron and one type of pearlitic malleable iron.

20-481. Oil Mist Can Be Eliminated. W. F. Herst and H. B. Heyl. *American Machinist,* v. 91, Aug. 14, 1947, p. 93.

Use of an electrostatic air cleaner to eliminate oil mist created by automatic screw machines.

20-482. Special Setups Turn Spherical Surfaces. C. A. Bloom, *American Machinist,* v. 91, Aug. 14, 1947, p. 108-112.

Tooling for precision boring and turning of ball and socket sections for self-aligning bearings and pillow blocks on a production basis.

20-483. Practical Ideas. *American Machinist,* v. 91, Aug. 14, 1947, p. 123-128.

Eccentric pivot bars made in square-bored adapter chuck, by C. W. Pressey. Lathe controls spacing, by J. C. Magee. Offset jack, by Wm. J. Coles. Lathe carriage stop, by Allan B. Nixon. Grinder attachment, by George A. Giller. Drill press stop, by Lloyd Sturmp. Dashed lines, by Henry H. Moore. Lathe setup cuts lugs, by Donald A. Baker. Inside countersink, by Allan B. Nixon. Checking drilled bolts, by Franz Sauerisch. How to check angle plates, by Theodore A. Buza. Squaring rods, by George E. Jones. Lathe toolholder jack, by M. S. Khaja Hohideen. Drilling parallels, by Cliff Bossmann. Tapered key fitting, by William Holmes. Magnetic wheel dresser, by D. E. McDonald. Spring winder. Boring bar holder, by C. W. Lightfoot. Chuck shoe, by Clement Reichel. Reversed boring, by Arthur F. Hird. Collet adapter, by C. Clarke. Adjustable height drill jig, by H. Moore. Multiple toolholder, by Arnold Dyck.

20-484. Honing and Lapping. Guy Hubbard. *Steel,* v. 121, Aug. 18, 1947, p. 86-88, 120.

History, development and significance of basic techniques in metalworking. Methods for removing minute layers of metal in precision sizing and finishing by modern machine tools. (Concluded.)

20-485. Air Tools Speed Manufacture of Automobile Bodies. *Steel,* v. 121, Aug. 18, 1947, p. 89-90, 129.

Tools and equipment in use at Nash body plant of Nash-Kelvinator Corp.

20-486. The Electronic Method of Contouring Control. J. Morgan. *Proceedings of the National Electronics Conference,* v. 2, 1946, p. 239-249.

The problem of automatic contouring control, and its solution by a combination of electronic and magnetic circuits.

20-487. Brinell Hardness Versus Machining Index as a Criterion of Machinability. G. Schlesinger. *Machinery (London),* v. 71, July 31, 1947, p. 122-127.

The first consideration in economical metal cutting is the selection of the right cutting speed which allows the work to be finished in the shortest time. Secondly, the tool should have a long life so that it will produce a large number of satisfactory parts before it requires regrinding. Results of tool life tests on steels of varying hardness, and cutting resistance tests.

20-488. Flairing Operation on the Automatic Screw Machine. C. H. Wummel. *Screw Machine Engineering,* v. 8, Aug. 1947, p. 40-42, 44.

Application of inexpensive yet effective tooling to both high and low volume production.

20-489. Rotary End Milling Attachment Eliminates Secondary Operation. *Screw Machine Engineering,* v. 8, Aug. 1947, p 45, 48-50.

Advantages of RA 6 Acme Gridley bar machine. Demonstrates the sound fundamentals of using a double rise lead cam, high-speed drilling attachments, and combining operations to increase production.

20-490. Highlights on Threading. H. F. Wieler and R. E. Bender. *Screw Machine Engineering,* v. 8, Aug. 1947, p. 66-69.

Reasons for lead error; causes of tapered threads; floating a die head when the turret or spindle is out of alignment; insert chasers; the machinability of various kinds of metals.

20-491. A Basis for Improved Machine Tool Design. Phil Huber. *Production Engineering & Management,* v. 20, Aug. 1947, p. 51-54.

Some new developments over the past 12 years.

20-492. High Velocity Increases Die Life. *Production Engineering & Management,* v. 20, Aug. 1947, p. 60.

New high-speed punch press known as the Hypermatic and made by Lempco Products, Inc., Bedford, Ohio. Speeds up to 1800 strokes per min. are readily achieved. A rotary instead of a reciprocal motion is used to actuate the dies.

20-493. Standard Attachments Increase Versatility of Impact Tool. *Production Engineering & Management,* v. 20, Aug 1947, p. 61.

New Ingersoll-Rand hand tool which will apply and remove nuts, drill, ream, tap, drive and remove screws, drive and remove studs, extract broken cap screws and studs, run wire brushes, do hole-saw work, drill brick and masonry and drive wood augers.

20-494. High-Frequency Tool Efficiency Depends on Maintenance of Torque. R. L. Gomon. *Production Engineering & Management,* v. 20, Aug. 1947, p. 62.

How the phenomenon of electric resonance, applied to voltage correction on high-frequency generators, helps the production rate of high-cycle tools.

20-495. The Crib. *Production Engineering & Management,* v. 20, Aug. 1947, p. 79.

Handy bench shear, by Edmund L. Johnson. Conserving diamonds, by Edward Diskavich.

20-496. Higher Production Possible on New "20" Grinding Wheel. *Production Engineering & Management,* v. 20, Aug. 1947, p. 86.

Advantages and applications of new abrasive wheels developed by Carborundum Co.

20-497. Hobbing Processes in Industry. John E. Hyler. *Steel Processing,* v. 33. Aug. 1947, p. 483, 486.

In the continuous process of machining known as hobbing, work is machined by the combined rotary motion of the cutter and the work. Different types of hobs.

20-498. Broaching Internal Clutch Teeth Automatically. C. W. Hinman. *Steel Processing,* v. 33, Aug. 1947, p. 489-490.

How an automatic broaching setup, using relatively simple broaches, can be designed to broach complex parts and effect substantial savings in production costs. In this operation internal involute gear teeth are automatically broached in heavy-duty clutch disks.

20-499. High Velocity Sawing. H. J. Chamberland. *Western Metals,* v. 5, Aug. 1947, p. 25-27.

High velocity sawing in comparison with friction sawing for cutting and shaping of aluminum, magnesium and related alloys.

20-500. How to Sharpen Cutting Tools. Harry S. Wharen. *American Machinist,* v. 91, Aug. 28, 1947, p. 101-120.

How to sharpen broaches, milling cutters, drills, tops, and single-point tools.

20-501. Unusual Applications of Superfinishing. E. L. Hemingway. *Machinery (London),* v. 71, Aug. 7, 1947, p. 156-157.

Superfinishing of reamers and punches to improve results and life; of steam-valve disks and seats to reduce steam leakage; of pump piston-rods to eliminate the rasp effect between the rod and the nonmetallic packing; of gun recoil pistons to improve performance; of aircraft engine parts to stop scoring; and of diesel engine crankshafts and automobile tappet valves to improve smoothness where they contact mating parts. Inspection of metal surfaces.

20-502. Simple Device for Radius or Profile Turning. *Machinery (London),* v. 71, Aug. 7, 1947, p. 157.

Shown diagrammatically.

20-503. Some Metallurgical Factors Which Affect Machinability With Special Reference to Intermittent Cutting. K. J. B. Wolfe. *Metal Treatment,* v. 14, Summer 1947, p. 103-110.

Comments on paper published in the Winter issue, contributed by H. S. Bavister, E. R. Gadd, D. Tabor, G. L. Talbot, and J. F. B. Jackson. Author's replies.

20-504. Internally Grooving Castings With a Special Tool. Robert Mawson. *Steel,* v. 121, Sept. 1, 1947, p. 80.

Diagram and description of method for machining a large unit housing.

20-505. Rapid Milling of Plates. *Industrial Power (U.S.S.R.),* v. 4, June 1947, p 7-8. (In Russian.)

An improved method of milling using negative cutting angles, for which large improvements in cutting rates and decreases in tool consumption are claimed.

20-506. Centerless Grinder Work Blade Life Lengthened. *Iron Age,* v. 160, Sept. 4, 1947, p. 79.

New blade developed by Cliff Co., Chicago, features a wearing surface of alternate sectional inserts of tungsten carbide separated by thin strips of alloy steel, laid in a slot with supporting walls of steel. Substantial reductions in blade costs are claimed.

20-507. Milling Fixture for Impulse Wheel. *Machinery (London),* v. 71, Aug. 14, 1947, p. 183-184.

Detailed drawings show fixture designed for milling three different types of teeth in an impulse wheel at one setup of the machine.

20-508. Centering Machine and Electronically Controlled Grinder. *Engineering,* v. 164, Aug. 15, 1947, p. 152.

A British machine tool.

20-509. An Automatic Magazine Screwdriver. *Machinery Lloyd (Overseas Edition),* v. 19, Aug. 16, 1947, p. 73-74.

Machine made in England.

20-510. Abrasive Wheel Cutting. H. Sanders. *Machinery Lloyd (Overseas Edition),* v. 19, Aug. 16, 1947, p. 76-81.

Advantages, limitations, techniques, wheel types, design, and other factors.

20-511. Toolpost for Internal Screw-cutting. *Machinery Lloyd (Overseas Edition),* v. 19, Aug. 16, 1947, p. 84-85.

British attachment.

20-512. A New Gear Generating Machine. *Machinery Lloyd (Overseas Edition),* v. 19, Aug. 16, 1947, p. 102-104.

A British machine tool.

20-513. Producing Tractor Gears. *Machinery (London),* v. 71, Aug. 21, 1947, p. 199-205.

Methods employed by British firm.

20-514. Profile Turning. *Machinery (London),* v. 71, Aug. 21, 1947, p. 206-207.

German and English methods for machining cams and similar work.

20-515. Gage Production on a Cone Center Grinding Machine. *Machinery (London),* v. 71, Aug. 21, 1947, p. 207.

20-516. Drill Jig for Pipe Manifold. *Machinery (London),* v. 71, Aug. 21, 1947, p. 209.

Diagram and description.

20-517. Axelson Hollow-Spindle Lathe. *Engineering,* v. 164, Aug. 22, 1947, p. 187.

Machine tool made in Los Angeles

20-518. More and Better Machines. George W. Hoehler. *Automotive Industries,* v. 97, Sept. 1, 1947, p. 72-74, 170, 174, 178, 181-182.

Recent advances in mass production equipment and techniques.

20-519. New Machine Tools and Production Equipment. *Automotive Industries,* v. 97, Sept. 1, 1947, p. 75-119, 186.

A large number of new machine tools and other items of production and plant equipment are described

20-520. Latest Production Equipment to be Seen at the Show. *Machinery,* v. 54, Sept. 1947, p. 154-158, 161-166, 169-174, 177-182, 185-190, 193-198, 201-206, 209-214, 217-222, 225-232, 235-249.

Machine tools and other metalworking equipment shown at Machine Tool Show, Chicago, Sept. 17-26.

20-521. Metal Cutting Techniques. O W. Boston. *Iron Age,* v. 160, Sept. 11, 1947, p. 185-189.

Today's cutting tools and techniques weighed against tomorrow's needs.

20-522. Milling Cutters. *Automobile Engineer.* v. 37, Aug. 1947, p. 302.

New design for negative rake use on machines of low horsepower.

20-523. Machine Tool Show in Print. *American Machinist,* v. 91, Sept. 11, 1947, p 195-294.

Products shown at Chicago, Sept. 17-26.

20-524. Machine Tools. *Russian Technical Research News*, v. 1, Sept. 1947, p. 27.

Abstracts of three articles from *Stanki i Instrument:* A new method of knurling, by G. A. Tukhvatulin Pneumatic chip remover, by A. L. Roginskii. Force of feed in high-speed friction saws, by N. I. Gorbatov.

20-525. Special Cutters—Precise Fashioners of Complicated Shapes. Jay DeEulis. *Steel*, v. 121, Sept. 15, 1947, p. 88-90, 126, 128, 130, 132, 135.

A number of special cutters, their applications, and processes used in making them.

20-526. Guards With a Grip. *Plastics (American)*, v. 7, Sept. 1947, p. 52-53.

Use of acrylic shields, with magnets to anchor them to ferrous surfaces, for protection from flying chips in metal machining operations.

20-527. Maintenance of Sintered Carbide Dies. *Industrial Diamond Review*, v 7, Aug. 1947, p. 238-240.

Boring with diamond points; applications of coarse and medium size diamond powder on soft and hard sticks; use of diamond bonded wheels. (From 1946 Protolite Die Maintenance Manual, Protolite, Ltd., London.)

20-528. Hand Sharpening Machine for Formed Milling Cutters. *Industrial Diamond Review*, v. 7, Aug. 1947, p. 243.

A Swiss machine.

20-529. Automatic Internal Grinding Machine. *Industrial Diamond Review*, v. 7, Aug. 1947, p. 248-249.

A British machine tool.

20-530. New Designs at the 1947 Machine Tool Show. *Product Engineering*, v. 18, Sept. 1947, p. 81.

Materials of construction; electrical and electronic control circuits; hydraulic systems and pneumatic controls; power transmission elements.

20-531. Rotor Housings Speeded by Special Drill Press. *Tool Engineer*, v. 19, Sept. 1947, p. 47.

In 60 sec., the new drill press drills 30 holes simultaneously in the 22x24x 4¾-in. cast aluminum housing which covers the horizontal revolving cutting blade. The same operation required twice as much time with previous equipment.

20-532. Production Tooling With Carbides. Watson N. Nordquist. *Tool Engineer*, v. 19, Sept. 1947, p. 48-50.

New carbide tooling technique which increases metal cutting rates.

20-533. Cost Cutting With Production Grinders. Anders Jansson. *Tool Engineer*, v. 19, Sept. 1947, p. 51-52.

Several modern grinding machines.

20-534. Automatic Size Control of Cylinder Bores. Gunnar Skog. *Tool Engineer*, v. 19, Sept. 1947, p. 53.

Improved process called Hydrosizing holds cylinder bore to a consistent ±0.0005 in. This tool now materially reduces, if it does not entirely eliminate, the selective fitting of pistons in automotive cylinder bores.

20-535. New Developments in Tooling Obsolete Old Work Standards. *Production Engineering & Management*, v. 20, Sept. 1947, p. 90-98.

Innovations in tooling and procedures in Ford's engine division.

20-536. Hollow Tap Shanks Cut Tool Costs. *Iron Age*, v. 160, Sept. 18, 1947, p. 69.

Use of shanks produced from steel tubing with an internally broached spline. The new shanks are particularly useful in operations such as tapping pipe couplings where fairly long shank taps are used to tap through several parts at a time, allowing the parts to load up on the shank.

20-537. Locating Holes Accurately With a Precision Drilling Jig. Robert Mawson. *Steel*, v. 121, Sept. 22, 1947, p. 86.

Description and diagrams show proper technique.

20-538. Development of a Special Drill for Plexiglas Fabrication. Beckh. *Headquarters Air Materiel Command, Wright Field, Dayton, Ohio (Translation F-TS-911-RE)*, July 1947, 38 p.

Tests with a new type of spiral drill bit, made of toolsteel with a more acute twist angle, polished chip duct and double cutting edge. This drill costs approximately 10% more than a standard spiral drill, but effects a time saving of 30 to 40% during machining. It can be manufactured on a standard-production automatic screw machine. (From publication of W. Kopperschmidt and Soehne, Hamburg, Germany, May 1942.)

20-539. Interesting Applications of Multipurpose Machines. J. H. Mansfield. *Machine and Tool Blue Book*, v. 43, Sept. 1947, p. 159-160, 162, 164-169.

Way drilling or tapping machines with one fixture and one or more heads presenting tools to different faces of the work. Horizontal and vertical indexing machines with several work stations and one position for loading and unloading the work. Transfer machines, which are frequently referred to as "holeway processing machines" or "automatic production lines".

20-540. How to Cut the Cost of Air-Operated Tools. R. C. Manning. *Iron Age*, v. 160, Sept. 25, 1947, p. 60-62.

A simple but accurate means of checking the actual pressure at the

tool; some of the causes of abnormally low pressures at that point.

20-541. New Type Cutter Boosts Gear Output. Walter G. Patton. *Iron Age,* v. 160, Sept. 25, 1947, p. 63.

Gear-cutting machine used by Ford to machine clutch hubs with teeth in six clusters of three each, at the rate of nearly two per min.

20-542. Hopper Feed Speeds Milling Operation. *Iron Age,* v. 160, Sept. 25, 1947, p. 80.

Automatic hopper feed for handling small round pieces in a milling operation developed by Fairchild Camera & Instrument Corp., Jamaica, N. Y.

20-543. Producing Tractor Components. (Continued.) *Machinery (London),* v. 71, Aug. 28, 1947, p. 227-235.

Manufacture of spur and helical gears and the driveshaft; riveting the crown wheel.

20-544. Group Driving for Power Economy. C. Hayward. *Machinery (London),* v. 71, Aug. 28, 1947, p. 235.

Advantages and disadvantages of driving machine tools in groups, through lineshaft-and-belt transmission from one large motor.

20-545. A Large Horizontal Boring and Milling Machine. *Engineer,* v. 184, Aug. 29, 1947, p. 203-205.

New machine developed in France and being built in Switzerland.

20-546. Fixtures Make Rotary Surface Grinders Automatic. Fred C. Schaub. *American Machinist,* v. 91, Sept. 25, 1947, p 69-73.

Typical attachments for grinding to half a thousandth on a continuous production basis.

20-547. How to Grind Carbide Die Parts. Rupert Le Grand. *American Machinist,* v. 91, Sept. 25, 1947, p. 85-96.

Use of preshaped carbide; contour grinding; steps in grinding and lapping round holes in carbide nibs; lapping and polishing operations; wheel selection; machine accessories; inspection equipment.

20-548. Practical Ideas. *American Machinist,* v. 91, Sept. 25, 1947, p. 107-112.

Accurate concave spherical seats made in boring mill, by Francis G. Forquer. Indexing planer tool cuts internal keyways and splines, by D. E. McDonald. Cup wheels can grind internal and external radii, by James E. McElwee. Nonslip drills, by Lyle C. Vinger. Staker for ball bearings, by Charles Kidwell. Tapped hole gage, by Cecil Curry. Wiggler, by George A. Giller. Jarno-tapered expanding plug eliminates bushing slippage, by Allan B. Nixon. Eccentric boring tool. by Gerhard Wenke. Planer cuts circular arcs, by C. D. Mackinnon. Stepped blocks, by Leonard T. Quick. Extended steady center, by T. Yates. Cam-cutting attachment fits any milling machine, by S. Framurz. Universal punching setup cuts drilling costs, by J C. Brenner.

20-549. The Sentinel Cri-Dan Threading Machine. *Machinery Lloyd (Overseas Edition),* v. 19, Aug. 30, 1947, p. 101-102.

British machine tool.

20-550. Spirits and Machine Tools. *Western Machinery and Steel World,* v. 38, Sept. 1947, p. 116-117.

Machine shop of San Francisco works of Schenley Distillers.

20-551. Mass Production Tools. C. D. Rockwell. *Western Machinery and Steel World,* v. 38, Sept. 1947, p. 123-125.

Production of custom-built broaching machines for miscellaneous applications by Pioneer Broach Co.

20-552. Gloster Meteor. Part II. Front Fuselage Construction and Assembly; Outer Wings; Machining of Spar Booms. S. C. Poulsen. *Aircraft Production,* v. 9, Sept. 1947, p. 330-337.

Manufacturing processes used in the production of the Gloster Meteor IV. (Concluded.)

20-553. A New Cleveland Model "AB" 2½-In. Single Spindle Screw Machine. *Screw Machine Engineering,* v. 8, Sept. 1947, p. 50-51, 54-56.

20-554. New No. 00G & No. 0G Brown & Sharpe Automatics. *Screw Machine Engineering,* v. 8, Sept. 1947, p. 58-63.

20-555. New Britain Automatic Magazine Stock Reel. J. T. Vinbury. *Screw Machine Engineering,* v. 8, Sept. 1947, p. 65-68.

20-556. The New 1¼-In. Model RB Acme-Gridley Bar Automatic. *Screw Machine Engineering,* v. 8, Sept. 1947, p. 70-72.

20-557. New Lead Screw Threading Arrangement for Greenlee Automatics. *Screw Machine Engineering,* v. 8, Sept. 1947, p. 74-75.

20-558. Warner & Swasey 5-Spindle Automatic. *Screw Machine Engineering,* v. 8, Sept. 1947, p. 77-81.

20-559. Stock Ends. *Screw Machine Engineering,* v. 8, Sept. 1947, p. 85.

Countersinking tubing, by R. H. Knowles. Cross slide stock stop, by Maurice C. Ohl.

20-560. Machinability and Structure of Ferrous Materials. C. Sykes. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 235-236; discussion, p. 267-291.

A qualitative discussion. (War Emergency Issue No. 20.)

20-561. The Mechanics of the Cutting Operation. R. N. Arnold and G. A. Han-

kins. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 238-240; discussion, p. 267-291.
Correlates available information. 10 ref. (War Emergency Issue No. 20.)

20-562. The Effect of Speed, Feed, and Angle on Machinability. W. Whitworth Taylor. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 258-259; discussion, p. 267-291.
Merchant has developed a relationship between shear angle, angle of friction, and cutting rake, and containing a machinability constant which is a true constant for any given material. Experimental data are presented and compared with calculated values. These verify Merchant's equation and also show that the efficiency with which any given material may be cut is affected by variations in speed, feed, and angle. The direction of these effects is stated qualitatively. (War Emergency Issue No. 20.)

20-563. Tool Materials. J. E. Attwood. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 260-261; discussion, p. 267-291.
Selection for different materials and operations. (War Emergency Issue No. 20.)

20-564. Heavy Engineering. G. M. Baker. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 263-264; discussion, p. 267-291.
Machinability in relation to the economics of the production of large machinery. (War Emergency Issue No. 20.)

20-565. Medium Engineering. L. Johnstone. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 264-265; discussion, p. 267-291.
Machinability in relation to the economics of the production of medium-size items. Comparative cost analyses. (War Emergency Issue No. 20.)

20-566. Light Engineering. P. C. Redwood. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 266; discussion, p. 267-291.
Machinability in relation to the economics of the production of small-size items. (War Emergency Issue No. 20.)

20-567. New Lathe Increases Production on Nonferrous Parts. T. C. Du Mond. *Materials & Methods,* v. 26, Sept. 1947, p 72-73.
Lathe known as the Electro-Cycle and manufactured by Warner & Swasey makes possible significant increases in production on parts made of brass, aluminum, rubber, and plastics. The greatest factor in providing a rapid work cycle is a method of automatic control which reduces handling time.

20-568. Drill Jig With a Window. Robert Mawson. *Material & Methods,* v. 26, Sept. 1947, p. 110.
Box-type drill jig with several unique features including a window to watch the drilling operation.

20-569. Jig Making Costs Reduced With New Speed Jig. *Machine and Tool Blue Book,* v. 43, Oct. 1947, p. 159-162.
Jig described consists of a number of precision-made parts including frame, bars, corner plates, bushing plates, base plates, and lock clamps which can be easily assembled into an infinite variety of jig and fixture patterns. It makes possible economical production of interchangeable parts requiring drilling and reaming various hole patterns.

20-570. Designing and Using Drill Jigs. C. W. Hinman. *Machine and Tool Blue Book,* v. 43, Oct. 1947, p. 164, 166, 168-172.
Designing procedures in general and specific problems in design of table jigs, jigs for drilling and use of same.

20-571. Finishing With Diamond Tools. Paul Grodzinski. *Machine and Tool Blue Book,* v. 43, Oct. 1947, p. 174, 176. 178, 180.
Finishing parts to one micro-inch with diamond single-point tools.

20-572. Lapped Tools Do a Better Job! *Modern Machine Shop,* v. 20, Oct. 1947, p 172, 174, 176, 178, 180.
Lapping machines produce tools to exact measurement and edge which can do a more accurate job and hold production for a longer time.

20-573. Ideas From Readers. *Modern Machine Shop,* v. 20, Oct. 1947, p. 202, 204, 206, 208, 210, 212, 214.
Radius fixture on boring mill, by A. R. McAllister. Spring-backed center aids metallizing operation. Eyeglass makes good eraser, by A. H. Waychoff.

20-574. How to Prevent Snagging Wheel Breakage. R. B. Fair. *Foundry,* v. 75, Oct. 1947, p. 82-84, 194, 198, 200.
Proper mounting of wheels and flanges for preventing breakage of abrasive wheels.

20-575. Relation of Machinability to Structure—Nonferrous Metallurgy. A. J. Murphy. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 236-238. (War Emergency Issue No. 20.)
A metallographic study of the mode of deformation in free-cutting nonferrous alloys would be helpful. This study should include an examination of the shearing process occurring at the tool face. 16 ref.

20-576. Nomenclature of the Cutting Edge. Max Kurrein and F. C. Lea. *Institution of Mechanical Engineers Proceedings,* v. 156, Sept. 1947, p. 126-133; discussion, p. 133-134.

Attention is drawn to various terms used to describe the angles of cutting tools and nomenclature adopted in published work and by makers. Rake is used in a number of ways, but always has reference to the face of the tool over which the chip moves but seldom has clearly defined reference to the angle measured on a plane at right-angles to the cutting edge. This angle very largely determines the cutting effects of the tool, and the authors suggest that it should be called the breast angle. Formulas for breast angles.

20-577. Valve Split Cotters. *Automobile Engineer,* v. 37, Sept. 1947, p. 337-338.

Tooling for their production on Wickham five-spindle automatics.

20-578. Machine Tools. *Automobile Engineer,* v. 37, Sept. 1947, p. 351-353.

Recent address by H. E. Linsley to the Wolverhampton section of The Institution of Production Engineers.

20-579. Form Tools. (Continued.) William F. Walker. *Edgar Allen News,* v. 2J, Sept. 1947, p. 905-907.

Tangential tools; shaving or skiving tools; and dovetail form tools. (To be continued.)

20-580. Machining Castings for the Ferguson Tractor. *Machinery (London),* v. 71, Sept. 18, 1947, p. 311-316.

Operations of the Standard Motor Co., Ltd.

20-581. Design of Gearwheels to Work at Reduced Centers. J. Turner. *Machinery (London),* v. 71, Sept. 18, 1947, p. 316.

Two methods to avoid reduction of distance between centers of a pair of shafts during reconditioning of machine tools.

20-582. Calculation of Offsets for Milling Spiral Cutters. K. G. Molnar. *Machinery (London),* v. 71, Sept. 18, 1947, p. 317-320.

Extends results previously derived to the special case of spiral milling.

20-583. Machine-Shop Operations in Producing Light Aircraft-Engine Crankshafts. M. F. Colburn. *Machinery,* v. 54, Oct. 1947, p. 146-150.

At Lycoming Division, Avco Mfg Corp., Williamsport, Pa.

20-584. Fine Finishes and Flatness Obtained by Surface Grinding. *Machinery,* v. 54, Oct. 1947, p. 152-153.

Production of finishes varying from 2 micro-inches for hardened steel to 15 micro-inches for aluminum.

20-585. Recommendations for the Band-Sawing of Steel Molding. H. J. Chamberland. *Machinery,* v. 54, Oct. 1947, p. 190.

Cross sections of eight typical mild-steel moldings varying from 3/32 to 1/8 in. Recommendations for the band-sawing of these shapes.

20-586. Air Size Control Gages Workpiece During Operation. J. E. Kline. *Machine Design,* v. 19, Oct. 1947, p. 88-91.

Details of method for control of micromatic honing operation.

20-587. Continuous Machine Filing Becomes a Production Tool. H. J. Chamberland. *Production Engineering & Management,* v. 20, Oct. 1947, p. 55-58.

Results of recent tests which indicate a steadily increasing use of this process on production work.

20-588. Automatic Spindle Control Cuts Lathe Operation Time. James H. Bennett. *Production Engineering & Management,* v. 20, Oct. 1947, p. 61-64.

Consistent reduction in operating time of turret lathes results from application of electric control to all spindle functions.

20-589. Efficiency Increased by Centralized Tool Control. *Production Engineering & Management,* v. 20, Oct. 1947, p 66-74.

Conversion to meet peacetime needs. Streamlined production methods at Jack & Heintz, Cleveland.

20-590. Advanced Techniques Characterize Southern Industry. Gerald Eldridge Stedman. *Production Engineering & Management,* v. 20, Oct. 1947, p 75-78.

Equipment and procedures used by Auto-Soler Co., Atlanta, Ga., manufacturers of machine tools for nailing.

20-591. The Crib. *Production Engineering & Management,* v. 20, Oct. 1947, p. 85.

Handy straight edge, by Edmund L. Johnson. A floating locator, by Roger Isetts.

20-592. Greater Production With Brown & Sharpe Automatics. A. E. Rylander. *Tool Engineer,* v. 19, Oct. 1947, p. 36.

The latest designs and their abilities.

20-593. Cam Units Cut Manufacturing Costs. Karl Stad. *Tool Engineer,* v. 19, Oct. 1947, p. 49.

How completely automatic station-type machines are being tailor-made for the job.

20-594. Fixtures for Casting Qualification. Part I. The Case for Casting Qualification. A. H. Blacker. *Tool & Die Journal,* v. 13, Oct. 1947, p. 60-64, 81-82, 84, 86-87.

Qualifying fixtures are used as an aid in locating rough castings for machining in order to assure that sufficient stock will be found at the locations to be drilled and machined, also to assure proper dimensions upon machining. They are also used to check the foundry equipment by use on the first casting produced. (To be continued.)

20-595. Good Layout Makes Oil Reclamation Pay. *American Machinist,* v. 91, Oct. 9, 1947, p. 88-89.

How batch reclamation of cutting oil can return useful oil to machines on almost continuous basis.

20-596. Why Buick Uses Clamp Toolholders for Carbide Shapes. Rupert LeGrand. *American Machinist,* v. 91, Oct. 9, 1947, p. 90-93.

How Flint plant uses more than 100 of the above setups on multiple-cut gear jobs to save money in seven different ways.

20-597. Fitting Carbides to Small Tools. James Safhill. *American Machinist,* v. 91, Oct. 9, 1947, p. 117.

How carbides were attached to tools for extremely small telephone parts by a British firm.

20-598. Practical Ideas. *American Machinist,* v. 91, Oct. 9, 1947, p. 119-124.

Bench centers measure shafts, by George F. Burnley. Magnifying scriber aids precise layout work, by A. F. Fuller. Lathe makes hour-glass worms, by Ching-Fu Chen. Permanent dogs, by Robert S. Alexander. Grids improve drawing dies, by Aleksander Wolosianski. Die repair, by Fordyce W. Brown. Floating reamer holder stays parallel, by G. A. Coleman. Wheel jig cross drills pins, by H. Moore. Uses of double-coated type adhesive tape, by H. C. Rickenbach. Improved clamp, by Edward O. Merical. Standardized keyways, by William C. Blackham. Diamond dressers clamp to workpiece, by Paul Grodzinski. Pipe fittings make drill conversion, by N. S. Beebe. Steadyrest, by T. Yates. Broaching slots, by Donald A. Baker. Welded pipe die saves hundreds of dollars, by Raymond F. Ball. Chuck guide, by Edmund L. Johnson. Tailstock coupling, by Lyle Vinger. Milling machines swing large diameters, by R. M. Dunlevy. Simple drill vise, by Arnold Dyck. Table stop frees miller operator, by John Meyer. Hexagonal broach, by Dana J. Mulholland. Shaper tests new dies, by Arnold Dyck.

20-599. Checking Squares and Angle Plates. E. J. Rychlik. *American Machinist,* v. 91, Oct. 9, 1947, p. 155.

How the error in both a square and an angle plate can be obtained from two readings taken with a dial indicator and height gage.

20-600. Safe Use of Portable Grinders. *American Machinist,* v. 91, Oct. 9, 1947, p. 157, 159.

Recommended procedures.

20-601. An Electromechanical Disk Saw for Metal. A. F. Ushakov. *Industrial Power (U.S.S.R.),* Aug. 1947, p. 9-10. (In Russian.)

Proposed method for cutting metal up to 150 mm. thickness by means of an electric arc thrown from a rotating "saw". The reinforced disk of soft steel has teeth which maintain an arc in constant contact with the work to be cut and at the same time remove the newly cut metal.

20-602. Swiss Grinding Machines. *Industrial Diamond Review,* v. 7, Sept. 1947, p. 267.

Two machines made by Miedsa (Machines Industrielles et Domestiques S.A., Carouge-Geneva).

20-603. Grinding Form Cutters With Radius Corners. *Industrial Diamond Review,* v. 7, Sept. 1947, p. 273.

Attachment is designed primarily for the Jones & Shipman tool and cutter grinder, but also useful on similar types of machines.

20-604. Precision Honing Machine. *Industrial Diamond Review,* v. 7, Sept. 1947, p. 279.

British machine which finishes internal cylindrical surfaces and corrects errors of ovality and taper. Mirror finished holes can be produced to very close tolerances as to size and straightness.

20-605. Machining Tractor Rear Axle Components. *Machinery (London),* v. 71, Sept. 4, 1947, p. 255-260.

From stamping to finished axle. Setup of machines used for milling, hobbing, drilling, and grinding.

20-606. A Useful Property of the 60° V-Block. J. Turner. *Machinery (London),* v. 71, Sept. 4, 1947, p. 260.

It is shown that the distance from the apex of the V to the center of a circular piece resting on the V is equal to the diameter of the circle. How this fact is applied to the centering of workpieces of varying diameters.

20-607. The Production of British Clearing Heavy Presses. *Machinery (London),* v. 71, Sept. 4, 1947, p. 264-266.

Some machinery operations used by Vickers-Armstrongs, Ltd.

20-608. Indexing Milling Fixture for Aluminum Alloy Cylinder. *Machinery (London),* v. 71, Sept. 4, 1947, p. 267-268.

Machining operations that are necessary. Design of fixture and how it is mounted.

20-609. Machining Die Cast Number Wheels. P. H. Gates. *Machinery (London),* v. 71, Sept. 25, 1947, p. 354-355.

Method used for combination-lock assembly.

20-610. Solid Carbide Boring Bars. *Iron Age,* v. 160, Oct. 23, 1947. p. 44-45
Precision boring with solid-carbide boring bars with length-to-hole-diameter ratios of as much as 8 to 1 is being done in steel, cast iron, meehanite, brass, and other metals. Three specific applications described.

20-611. Machine Tools in Carbide Tool Plant. *Western Machinery and Steel World,* v. 38, Oct. 1947, p. 86-87.
Equipment for regrinding, resharpening, and manufacture of carbide tools.

20-612. Shop Kinks. *Western Machinery and Steel World,* v. 38, Oct. 1947, p. 110.
Lathe centers (reconditioning). Adjustable arbor. Combination boring tool holder.

20-613. Report of Committee on Shop Tools. *Railway Mechanical Engineer,* v. 121, Oct. 1947, p. 580-583.
Increasing use of carbide tools for the machining of locomotive parts emphasizes need for modern machine tools of proper design and sufficient capacity. (Presented at Locomotive Maintenance Officers' Meeting, Chicago, Sept. 15-18, 1947.)

20-614. A Low Cost Drilling Jig. *Materials & Methods,* v. 26, 1947, p. 122.

20-615. Turbine-Blade Milling. *Aircraft Production,* v. 9, Oct. 1947, p. 381.
New hydraulically controlled machine tool.

20-616. Turning and Milling. *Aircraft Production,* v. 9, Oct. 1947, p. 396-397.
Some developments in carbide cutting-tool practice.

20-617. Planned Production. *Screw Machine Engineering,* v. 8, Oct. 1947, p. 36-39.
Advantages of using attachments to produce a completed part and also stresses many fine points in screw-machine tool design and layout. Details of the manufacture of a complex screw-ended shaft.

20-618. Loading Work With the Slotting Attachment Transfer Arm. L. W. Richhart. *Screw Machine Engineering,* v. 8, Oct. 1947, p. 42-44.
The completion of screw-machine products by utilizing the automatic as a secondary operation machine. Four distinct advantages are obtained by this method of tooling. Method as applied to a specific part calls for the transfer arm of the slotting attachment being used as a loading station, thus making it possible to transfer the part to the work collet without stopping the machine.

20-619. Computing Lead Cam Cut-Down. Herbert W. Smith. *Screw Machine Engineering,* v. 8, Oct. 1947, p. 45-47.
Procedure utilizing paper or cardboard dummies representing the body length of each turret tool holder. These dummies are used in conjunction with a full-scale drawing of the part in position at the work spindle with allowance for cut-off width and clearance to the collet face.

20-620. Broader Spindle Speed Ratios for No. 00 Regular Brown & Sharpe Automatics. *Screw Machine Engineering,* v. 8, Oct. 1947, p. 48-52.
Threading nickel, nickel-chromium, or stainless steel requires a low surface speed, while the forming and cutting-off operation requires a comparatively high surface speed. The desired combination of spindle speeds cannot be obtained by usual procedures. Three cam layouts for alleviating the difficulty.

20-621. Stock Ends. *Screw Machine Engineering,* v. 8, Oct. 1947, p. 61.
Counterbore with knee tool, by Maurice C. Ohl. Variation in over-all length of parts, by Michael Gibsman. Turret stops, by John G. Ozga.

20-622. The Production of Fuel Injection Nozzles. *Machinery (London),* v. 71, Oct. 2, 1947, p. 367-374.
Methods used at English factory.

20-623. Optical Profile Grinder. *Machinery (London),* v. 71, Oct. 9, 1947, p. 404-405.
Machine produced by Ultra Prazisionswerk at Aschaffenburg incorporates an optical system which was supplied by Leitz of Wetzlar. It is designed for finishing the forms of accurate templets, straight and circular form tools, and other profiled work, the contour of the work being compared with an enlarged drawing as the operation proceeds.

20-624. Cooling Large Workpieces During Centerless Grinding. *Machinery (London),* v. 71, Oct. 9, 1947, p. 406-407.
A grinding test which shows that with increasing contact area the usual coolant arrangement becomes unsatisfactory. Diagram shows the coolant-supply system which remedied the difficulty.

20-625. Automatic Milling Machines Solve Spar Cap Production Problems at Douglas. V. C. Fergen and C. R. Wulffsohn. *Automotive Industries,* v. 97, Oct. 15, 1947, p. 38-40.
Use for molding of main internal beams or spar caps from single billets of aluminum-alloy material.

20-626. Cranky Shapes Yield. *American Machinist,* v. 91, Oct. 23, 1947, p. 106-108.

Gear shapers can be set up to handle many odd-shaped pieces, for instance: irregular cams, square holes, multiple holes, cone-shaped ends, hourglass shapes, interrupted surfaces, irregular shaped pawls, taper surfaces, jaw-tooth clutches.

20-627. Short Cuts for the Small Shop. A. H. Waychoff. *American Machinist,* v. 91, Oct. 23, 1947, p. 112.

Trays for small parts are easily made from fruit-juice cans; chips can be removed efficiently from die stocks by placing them on top of a strong magnet; and a burnt hand and spilled babbitt can be prevented by applying a sliding grip to the ladle handle.

20-628. Tolerance Charts Forecast Accuracy. James K. Matter. *American Machinist,* v. 91, Oct. 23, 1947, p. 114-118.

Use of tolerance charts to examine a series of machining operations planned for a given part in order to determine whether or not the part will reach the end of the last operation with the desired dimensions and tolerances.

20-629. Practical Ideas. *American Machinist,* v. 91, Oct. 23, 1947, p. 119-124.

Compound punch and die makes three washers, by Burnett Menkin. Bunsen aids small brazing, by Norman Laycock. Form turning attachment, by Donald A. Baker. Lathe fixture slots screws, by George Burnley. Brake prevents kick-back, by Thomas H. Duffy. Centering diamond wheels, by Norman Ingalls. Carbide scriber, by Frank A. Bynum. Compass attachment, by James D. Cuyler. Drill press reams gear blanks, by James Broderick. Carriage lever operates old lathe, by K. Wysocki. Shaper doubles as punch press, by Felix J. Zagumny. Tapered key fitting, by U. Wheatley. Hand burr, by T. C. Clark. Lens spanner, by George Burnley. Trade mark stamper, by Stephen M. Lounsberry. Colleted faceplate has quick lock, by Richard E. Stern. Acme thread cutting, by Frank H. Schwerin. Removing taper pins, by Henry Smith. Coupling feeds tailstock, by Allan B. Nixon. Steadyrest aids long slot milling, by H. Moore. Light beam spots hole center, by Lawrence L. Hausman. Low-cost turret, by C. W. Pressey. Irregular part holder, by A. D. N. Scott. Swaging eliminates welding, by George Thomas.

20-630. Special Tooling for Servel Gas Refrigerators. Gerald Eldridge Stedman. *Modern Machine Shop,* v. 20, Nov. 1947, p. 124-128, 130, 132.

Some of the special tools that have been designed by Servel tool engineers

20-631. Ideas From Readers. *Modern Machine Shop,* v. 20, Nov. 1947, p. 244, 246, 248, 250, 252, 254, 256, 258, 260.

Sphere turning to close limits, by William E. Welch. Milling coiled stock, by John E. Hyler. Handy measuring tool, by D. E. McDonald. Stud removing simplified.

20-632. Short Cuts for the Small Shop. A. H. Waychoff. *American Machinist,* v. 91, Nov. 6, 1947, p. 97.

Hand-tap lubrication; cleaning and tinning of soldering irons; lathe dog for soft metals; hand vise for thin stock.

20-633. Dial Feeds Synchronized by Air. Joseph F. Budnick. *American Machinist,* v. 91, Nov. 6, 1947, p. 101-103.

Use of air systems for synchronizing dial feeds for small parts and controlling work at each station in small-part assembly.

20-634. Ideas That Save Planer Time. J. J. Madden. *American Machinist,* v. 91, Nov. 6, 1947, p. 104-105.

Some new ideas which result in large time savings in manufacture of printing-press beds and side frames.

20-635. Ford Throws Out Filter Bags. Rupert Le Grand. *American Machinist,* v. 91, Nov. 6, 1947, p. 126-127.

New centralized filtration system for removing chips from grinding coolant. Cost comparison shows 96.5% savings in operating expense.

20-636. Practical Ideas. *American Machinist,* v. 91, Nov. 6, 1947, p. 135-140.

Multiple drilling attachment handles many different jobs, by W. H. McCullough. Vise permits fast lathe boring, by Lawrence L. Hausman. Radius gage. Mandrel squares thin blanks, by Donald Campbell. Piercing die used in vise, by Gustav A. Soderberg. Saving stripped threads, by Eugene W. Dunlap. Cutoff stop, by Sam Bendick. Spirit level Tee guides hand drill, by Edwin A. Hoppe. Indicator tests right angles, by Gerhard Wenke. Die holder, by Al Sobozak. Spherical grinding. Spot facer trues seats, by E. L. Clark. Jig counterbore has micrometer nonslip depth adjustment, by H. Moore. Crush dressing, by Willet Kilbank. Wide-step jaws hold thin rings and tubes, by Robert Mawson. Universal clamp extends surface gage applications, by Homer Tate. Making a symmetrical die casting die cavity, by Robert J. Lachow. Form cutters, by C. Clarke. Cam jig, by Donald Campbell. Emergency taps.

20-637. The Manufacture of Fuel Pump Elements. *Machinery (London),* v. 71, Oct. 16, 1947, p. 423-431.

Methods used at a British plant.

20-638. Self-Centering Reaming Fixture for Spinning Caps. *Machinery (London),* v. 71, Oct. 16, 1947, p. 435.

Precision reaming tool for production of parts used in textile-manufacturing machinery.

20-639. Reconditioning Cutting Tools for Maximum Efficiency. H. A. Frommelt. *Steel,* v. 121, Nov. 10, 1947, p. 102-105, 131, 134.

How to avoid machining trouble by applying latest tested and approved cutter-grinding methods.

20-640. Design Aspects of the Machine Tool Show. Roger W. Bolz. *Machine Design,* v. 19, Nov. 1947, p. 113-116.

20-641. Cutting Costs With High-Cycle Electric Portable Tools. F. J. Hejduk. *Machinery,* v. 54, Nov. 1947, p. 140-143.

Advantages and typical applications on different classes of work.

20-642. Machining Ford Carburetor Die Castings. Herbert Chase. *Machinery,* v. 54, Nov. 1947, p. 144-148.

Machining setups and fixtures at Ford's Milford, Mich., plant.

20-643. Tool Engineering Ideas. *Machinery,* v. 54, Nov. 1947, p. 169-171.

Determining the developing angles for circular forming tools, by Fritz L. Keller. Cam-operated air vise, by Mark W. Purser. Turning thin-walled bushings with a single-point tool, by Donald A. Baker.

20-644. Pneumatic Fixture Simplifies Broaching. *Compressed Air Magazine,* v. 52, Nov. 1947, p. 281.

Air-operated eccentric fixture developed by Colonial Broach Co. for service in connection with 10-ton hydraulic press, for broaching keyway slots in heavy-duty steering knuckles.

20-645. Improvement in the Geometry of the Cutting Tool. I. M. Neklepaev. *Industrial Power (U.S.S.R.),* v. 4, Sept. 1947, p. 8-10. (In Russian.)

Changes in the profile of cutting tools which are claimed to result in superior performance.

20-646. Cutting Tools for Brass. George F. Wheeler. *Production Engineering & Management,* v. 20, Nov. 1947, p. 51-55.

Various special-purpose tools used to good advantage in machining brass castings, forgings, and bar stock.

20-647. Carbide Tips Lower Machine Downtime. *Production Engineering & Management,* v. 20, Nov. 1947, p. 55.

Manufacture of split-bolt connectors from special free-cutting bronze.

20-648. Ingenious Fixtures Increase Efficiency of Machine Tools. *Production Engineering & Management,* v. 20, Nov. 1947, p. 66-74.

Various fixtures and procedures used in production of outboard motors. Efficiency has been improved by volume producing in one plant all of certain parts required for assembly work in the other four plants.

20-649. The Crib. *Production Engineering & Management,* v. 20, Nov. 1947, p. 83.

An adjustable square, by Kurt E. Wohlgemuth. A better adhesive, by Edward Diskavich. Repairing compasses, by A. E. Lawrence.

20-650. Automatic Hob and Helical Spline Grinding Machine. *Industrial Diamond Review,* v. 7, Oct. 1947, p. 308-309.

British-made machine tool.

20-651. Fine Boring Machine for Half-Bearings. *Industrial Diamond Review,* v. 7, Oct. 1947, p. 309.

British-made machine tool for producing high-surface-finish half-bearings with high dimensional accuracy.

20-652. Air Control for Machining Die Castings. *Die Castings,* v. 5, Nov. 1947, p. 58-62.

Equipment and procedures for "free" facing operation; synchronized multi-operation; four operations on die-cast zinc shock-absorber piston, including beveling, facing, flash removal, and a broaching inspection; finish reaming two holes; threading a burner; broaching four surfaces; and three operations on a valve.

20-653. Modern Tooling Techniques. *Screw Machine Engineering,* v. 9, Nov. 1947, p. 39, 42-46.

Tooling for production of 2.32 x 0.35-in. complex part on a 1¼-in. model-601, New Britain, automatic screw machine.

20-654. Loading Parts From Rear of the Spindle for Secondary Operation Work. *Screw Machine Engineering,* v. 9, Nov. 1947, p. 47-51.

Loading device utilizes the bore of the spindle for feeding the parts and loading the work collet. This type of loader particularly lends itself to long parts which, when butted together, resemble a bar of stock.

20-655. Burnishing Tools and Holders. *Screw Machine Engineering,* v. 9, Nov. 1947, p. 52-53.

Use of the multiple-spindle automatic.

20-656. Tooling Methods for Brown & Sharpe Automatics. *Screw Machine Engineering,* v. 9, Nov. 1947, p. 54-57.

Tooling and camming arrangement which eliminates burrs from the heads of two different angular-headed screws, and also results in 60% increase in production over usual methods.

20-657. A New Concept in the Field of Abrasives. A. Albert Klein and Gordon

T. Rideout. *Tool Engineer,* v. 19, Nov. 1947, p. 17-23.
A new alpha-alumina abrasive and its manufacture by separate crystallization of individual grains. Applications and advantages.

20-658. **The Machine Tool Show in Review.** A. E. Rylander. *Tool Engineer,* v. 19, Nov. 1947, p. 24-32.
Verbal sketches and pictorial displays of Chicago show.

20-659. **Movement Between Work and Locator.** Hans W. Smith. *Tool Engineer,* v. 19, Nov. 1947, p. 41.
Locators in bores are frequently relieved on the sides to permit minor movement of the work in the relieved direction while holding the work close on the unrelieved part of the diameter. Calculation of the amount of movement permitted by the locator.

20-660. **Better Holes With Solid Carbide Boring Tools.** *Tool Engineer,* v. 19, Nov. 1947, p. 48.
Difficulties in holding desired tolerances (0.0002 in. to 0.00005 in.) when boring $\frac{3}{16}$-in. cylinder holes in the bronze bodies of hydraulic pumps were overcome by the use of solid Carboloy cemented-carbide boring bars.

20-661. **Cast Alloys Vary in Cutting Efficiency.** J. B. Dym and T. Badger. *American Machinist,* v. 91, Nov. 20, 1947, p. 109-111.
Results of extensive investigation of tool breakdown, life, speed and feed change, interrupted cuts, and tool grinding, which showed wide variation between materials and excellent results by proper use.

20-662. **Practical Ideas.** *American Machinist,* v. 91, Nov. 20, 1947, p. 119-124.
Fabrication of twisted-link welded steel chains, by N. Malmgren. Fast chamfering method for brass plates, by Bernard Lévowich. Built-up embossing dies from plate stock to save money, by Raymond F. Ball. Hole layout on small rectangular blocks, by George A. Filepas. Reciprocating countersink burrs cylindrical work, by Dana J. Mulholland. Cone gage sets tailstock, by Roy C. Van Kirk. Longitudinal long radii turned with A-frame, by Henry George. Micrometric divider compass for precision circles, by George A. Giller. Drillpress attachment for heavy tapping, by L. S. Rowland. Multiple-spindle drill-head powered by lathe faceplate, by George W. Dahl.

20-663. **Standardized Fixtures for Machine Work.** *Aircraft Engineering,* v. 19, Oct. 1947, p. 334-335.

20-664. **Machining Stainless Steel Valves.** A. P. Nelson. *Machinery (London),* v. 71, Oct. 30, 1947, p. 479-483.
Recommended practice and tools for turning, drilling, and threading stainless steel parts, and the coolant employed in machining operations.

20-665. **Vernier for Setting Vertical Turret.** *Machinery (London),* v. 71, Oct. 30, 1947, p. 483.
Use to facilitate accurate setting of the turret of a Bullard vertical lathe for turning short tapers.

20-666. **Safe Feeds and Speeds for High-Speed Twist Drills.** *Machinery (London),* v. 71, Oct. 30, 1947, p. 489.
A tabulation covering important ferrous and nonferrous materials.

20-667. **V-Block for Odd-Shaped Punches.** *Machinery (London)* v. 71, Oct. 30, 1947, p. 498.

20-668. **Form Tools.** William F. Walker. *Edgar Allen News,* v. 26, Nov. 1947, p. 941-944.
Dovetail form tools; tipped tools; composite tools. (To be continued.)

20-669. **Machining Cast Aluminum Alloys.** J. J. Stobie, Jr. *Modern Metals,* v 3, Nov. 1947, p. 16-23.
Tooling, cutting compounds, lathe practice, cutting speeds, shaping, drilling, reaming, tapping, threading, sawing, and filing. 48 ref.

20-670. **Machining Castings.** A. O. Schmidt. *American Foundryman,* v. 12, Nov. 1947, p. 22-27.
Methods used to determine machinability to determine tool life, effect of cutting speeds, of rake and clearance angles and of milling-cutter blade arrangements.

20-671. **Experimental Study of Cylindrical Grinding.** R. E. McKee, R. S. Moore, and O. W. Boston. *Transactions of the A.S.M.E.,* v. 69, Nov. 1947, p. 891-896.
Investigation of the grinding process; variables such as table-traverse feeds, depths of cut, wheel grain and grade, and type and concentration of cutting fluid.

20-672. **Stockton Tools Four Continents.** Gordon B. Ashmead. *Western Machinery and Steel World,* v. 38, Nov. 1947, p. 66-71.
Procedures and equipment of Rheem Mfg. Co. for making machine tools.

20-673. **Precision Tooling in Miniature.** *Western Machinery and Steel World,* v. 38, Nov 1947, p. 82-83, 104.
Miniature lathe is less than 10 in. long, 3¾ in. wide, and 6¾ in. high, and has many applications in jewelry, radio and other fields.

20-674. **Jigs and Fixtures Accelerate Heavy Band Saw Cuts.** H. J. Chamberland. *Western Machinery and Steel World,* v. 38, Nov. 1947, p. 87-89.
Recent improvements in band-saw cutting of metals.

20-675. **Form-Dressing of Grinding Wheels.** W. A. Carter. *Aircraft Production,* v. 9, Nov. 1947, p. 407-411.

Advantages of two methods, summing up rather in favor of the crusher roll for production machining.

20-676. **Machining Turbine Blades. Part I. Specialized Equipment for Turning, Grinding or Milling Efficient Profiles.** T. A. Kestell. *Aircraft Production,* v. 9, Nov. 1947, p. 412-415.

Review is based upon a paper prepared for reading before the Institution of Mechanical Engineers on Oct. 31st under the title, The manufacture of turbine blades for the Whittle engine. (To be concluded.)

20-677. **Slitting Rotating Work.** *Aircraft Production,* v. 9, Nov. 1947, p. 416.

Unconventional automatic tooling.

20-678. **High-Speed Pictures for High-Speed Production.** *Modern Industry,* v. 14, Nov. 15, 1947, p. 81-82, 84, 86.

High-speed motion-picture photography for analysis of rapid movements has proved useful in solving a large number of production problems, including determination of most efficient rake angle on planing and milling machines, by observation of chip formation in slow motion.

20-679. **Special Tooling Used in Machining Heavy Processing Equipment.** *Steel,* v. 121, Nov. 24, 1947, p. 86-88, 122.

Some of the equipment used to produce absorption plants, cane crushers, concentrators, crystallizers, digesters, dryers evaporators, extractors, fractionating columns, nicotine sulphate plants vacuum pumps, Vallez rotary filters, vulcanizers, Webb cotton presses and other heavy equipment.

20-680. **Electronically Controlled Multiple-Wheel Grinder.** *Automotive Industries,* v. 97, Dec. 1, 1947, p. 34.

Multiple-wheel crankshaft grinder, installed at Packard for grinding the main-bearing line of its eight-cylinder engine crankshaft.

20-681. **Practical Ideas.** *American Machinist,* v. 91, Dec. 4, 1947, p. 115-120.

Seam-welder cleaning attachment improves weld quality and finish, by Charles Kidwell. Sharper toolholder permits large range of tool positions for die work in confined locations, and eccentric boring chuck simplifies fly-cutter milling and boring, by George A. Giller. Measuring actual diameter of bevel gears, by Hubert G. Smith. Measuring convex arc radii, by S. Framurz. Die-milled serration cutter which can be reground indefinitely, by Charles Kidwell. Clock spring retracts miller table in automatic cycle, by Burl W. Mansberger. Hot-spinning flares steel tubes, by B. L. Wade. Geared angle vise speeds die work, by J. A. Peterson. Swing and ball-joint fitting adjusts cutting-oil flow, by Chris Winkler. Other miscellaneous shop hints.

20-682. **B.S.A. No. 48 Single-Spindle Automatic Screw Machine.** *Machinery Lloyd (Overseas Edition),* v. 19, Nov. 8, 1947, p. 84-86.

British-made machine tool.

20-683. **Tooling the Automatic Screw Machine. Part XX.** Noel Brindle. *Modern Machine Shop,* v. 20, Dec. 1947, p. 134-136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164.

Procedure to follow in designing cams for the Brown & Sharpe automatic screw machine.

20-684. **Time Saving of 60% With Modern Machine Tool.** *Modern Machine Shop,* v. 20, Dec. 1947, p. 197-198, 200, 202.

Use of 16-in. "electric-cycle" Warner & Swasey screw machine for machining a ⅝-in. brass angle valve and also for other miscellaneous production applications.

20-685. **Ideas From Readers.** *Modern Machine Shop,* v. 20, Dec. 1947, p. 204, 206, 208, 210.

Hopper feed fixture for milling machine. Mirror reflects progress in grinding die chasers. Car wheel lift, by Bartlett West. Attachment for burring drilled holes, by Gerald Eldridge Stedman.

20-686. **Ingenious A-C Adjustable Speed Drive.** *Product Engineering,* v. 18, Dec. 1947, p. 128-129.

Drive with substantially flat speed regulation used to power the regulating wheel on the Landis Tool centerless grinder. (From "A New Drive for a New Machine for a New Technique", by W. E. Happel. Presented at 1947 Westinghouse Machine Tool Electrification Forum, Buffalo, N. Y.)

20-687. **Service Life of Machine Tools Extended by Cemented Carbides.** Harry Crump. *Production Engineering & Management,* v. 20, Dec. 1947, p. 56-60.

How rapid wear of critical parts can be retarded by a judicious application of cemented carbides.

20-688. **Novel Lathe Accessory.** R. C. Spain. *Production Engineering & Management,* v. 20, Dec. 1947, p. 81.

Device which, when attached to an engine lathe having V-ways, will automatically measure axial movement of the turning tool, boring bar, or threading tool as the carriage moves along the lathe ways.

20-689. **Four Outstanding Tooling Ideas.** S. L. Daugherty. *Screw Machine Engineering,* v. 9, Dec. 1947, p. 38-41.

Use of four unique ideas to permit

production of a Sheaffer fountain-pen part of nickel-silver on an automatic screw machine.

20-690. Worm Generating on the Automatic Screw Machine. *Screw Machine Engineering,* v. 9, Dec. 1947, p. 43-46.

20-691. Screw Machine Engineering Data Sheet; Circular Forming Tool Holders. *Screw Machine Engineering,* v. 9, Dec. 1947, p. 51.
Diagrams and a table of dimensions.

20-692. Profitable Use of Screw Machine Attachments. *Screw Machine Engineering,* v. 9, Dec. 1947, p. 52-55.
Five alternate methods for producing a typical small part, showing advantages of screw-machine processing.

20-693. Extended Turret Stop for Brown & Sharpe Automatics. John G. Ozga. *Screw Machine Engineering,* v. 9, Dec. 1947, p. 57.
Simple method illustrated extends the length capacity of any model Brown & Sharpe automatic.

20-694. Stock Ends. *Screw Machine Engineering,* v. 9, Dec. 1947, p. 59.
Combined releasing and nonreleasing holder, by George Schrader. Positioning of the turret. Stock reel lock.

20-695. Rapid Method of Producing Powdered-Metal Aircraft Parts. *Machinery,* v. 54, Dec. 1947, p. 146.
How grooving operations on powdered-metal aircraft parts are being performed four times faster by the conversion of a standard Walker-Turner radial cut-off machine to an automatic grooving unit. The cut-off machine is equipped with a diamond-impregnated metal wheel and a magnetic chuck mounted on an automatic index table.

20-696. Electronic Motor Drives Increase Machine Tool Versatility. R. B. Crawford. *Machinery,* v. 54, Dec. 1947, p. 156-159.
Advantages of the above.

20-697. Broaching Jet-Propulsion Engine Parts. *Machinery,* v. 54, Dec. 1947, p. 169-170.
Fixture used in the above.

20-698. Tool Engineering Ideas. *Machinery,* v. 54, Dec. 1947, p. 189-191.
Fly cutter of wide range, by Robert Mawson. Lathe fixture for pointing spindles, by Harold E. Murphey.

20-699. Machining Turbine Blades. Part II. Blade Analysis; Work-Holding; Cam Development. T. A. Kestell. *Aircraft Production,* v. 9, Dec. 1947, p. 460-465.
The main theoretical considerations underlying the design and use of the Kestell blade-profiling machine and its associated equipment. (Condensed from "The Manufacture of Turbine Blades for the Whittle Engine", presented to Institution of Mechanical Engineers.)

20-700. Cost Cutting With Multiple Broaching. *Tool Engineer,* v. 19, Dec. 1947, p. 20.
How three splines are broached in each of four S.A.E. 1112 steel, bicycle coaster-brake-hub shells in one pass and at the rate of 630 pieces per hr.

20-701. A Quick-Acting, Positive Drill Jig. Robert Mawson. *Tool Engineer,* v. 19, Dec. 1947, p. 36.
Simple design provides quick loading and unloading for small-lot production runs.

20-702. Accurate Broaching of Round Holes. Frank Zagar. *Tool Engineer,* v. 19, Dec. 1947, p. 37-39.
Various means of producing round, straight holes under adverse conditions.

20-703. Transfer-Matic Speeds Production. Watson N. Nordquist. *Tool Engineer,* v. 19, Dec. 1947, p. 44.
How a cross 5-station, automatic-cycle machine produces 150 rear-axle housings hourly with a single operator.

20-704. Machining by Erosion. B. R. Lazarenko and N. I. Lazarenko. *American Machinist,* v. 91, Dec. 4, 1947, p. 120-121.
New Russian machine tools which are said to form holes to almost any shape and to dress tools without causing surface flaws by use of a vibrating, but not rotating, spindle to which a tool of almost any desired shape may be attached.

20-705. Practical Ideas. *American Machinist,* v. 91, Dec. 4, 1947, p. 129-134.
Adjustable jig for locating double centers, by H. Moore. Double-crank adjustable miller table for circular cuts, by Charles Schisler. Triple-unit reamer tap for finishing large holes and hand tool for burring deep recesses, by Charles Kidwell. Drill jig to replace vise jaws, by Arthur F. Hird. Split chuck for short diversified jobs, by Arthur Silvester. Two-flute floating reamer for centering large bores, by Martin H. Ball. Short-stroke press for cup drawing, by Bernard Berman. Screw device to control helical-flute grinding, by A. A. Sinisi, and other miscellaneous shop hints.

20-706. Radius-Truing Centerless Grinder Wheels. *Iron Age,* v. 160, Dec. 11, 1947, p. 93.
Device designed by a British firm which enables a variety of radii to be generated on a grinding wheel.

20-707. Solving Common Bandsawing Troubles. *Iron Age,* v. 160, Dec. 18, 1947, p. 59.
Many of the common troubles; corrective recommendations.

20-708. Calculating the Cams for Automatic Lathes With Movable Headstock. (Continued.) Andre Daetwyler. *Microtechnic (English Section)*, v. 1, Oct. 1947, p. 105-109. (Translated from the French.)

A very simple example. The recommended working procedure. (To be continued. For illustrations, see *French Section*, p. 233-240.)

20-709. Simplifying the Drilling of Marked-Off Holes. H. Moore. *Aircraft Engineering*, v. 19, Nov. 1947, p. 366.

A few innovations in laying-out the location of the holes.

20-710. Profile Turning. *Aircraft Engineering*, v. 19, Nov. 1947, p. 367.

German and English methods for machining cams and similar profiles.

20-711. New Plant and Tools. *Automobile Engineer*, v. 37, Nov. 1947, p. 404-406.

Recent developments in machine tools for automobile production.

20-712. Machining by the Spark Method. *Russian Technical Research News*, v. 1, Nov. 1947, p. 32.

Reviews three recent papers from *Stanki i Instrument*, on the process.

20-713. Some Fundamental Factors Involved in Intermittent Metal Cutting Processes, With Special Reference to Shaping. K. J. B. Wolfe. *Transactions of American Society for Metals*, v. 40, 1948, p. 120-142.

The fundamental difference between continuous and intermittent cutting, as represented by shaping, is mainly due to the presence of repeated impact loads on the tool in the latter process. Also, the tool has a nonuniform velocity in intermittent cutting. Presents a mathematical relationship containing four constants, which, however, vary with tool geometry, tool material, and material being cut; among maximum tool velocity, tool-impact velocity, and tool life.

20-714. Effects of Grinding on Physical Properties of Hardened Steel Parts. Howard E. Boyer. *Transactions of American Society for Metals*, v. 40, 1948, p. 491-504; discussion, p. 504-512.

See item 20-461.

SECTION XXI

LUBRICATION AND FRICTION

Bearings

21-1. Treatments of Drawing Compounds. *Steel,* v. 119, Dec. 30, 1946, p. 96.

Additions of sulphur, antioxidants, polar compounds and inert organic materials impart specific qualities to drawing compounds.

21-2. Pointers on Pouring Babbitt Bearings. K. T. MacGill. *Western Metals,* v. 4, Dec. 1946, p. 22-23.

Cleaning, melting, and pouring of the bearings.

21-3. Rolling Bearing Technique. R. K. Allan. *Machinery (London),* v. 69, Dec. 12, 1946, p. 758-761.

The geometry of various possible roller bearing designs and contact areas calculated for different types. From this, the loads per unit area for a given total load are worked out. Amounts of radial and plastic deformation for different loads; load distribution within the bearing. (To be continued.)

21-4. Forming Lubricants. Gilbert C. Close. *Finish,* v. 4, Jan. 1947, p. 19-22, 60, 62.

Variables affecting choice of the proper lubricant; how proper lubricant is selected; importance of boundary lubrication. Ten desirable properties of a forming lubricant.

21-5. Kinetic Friction in or Near the Boundary Region. I. Apparatus and Experimental Methods. B. Chalmers, P. G. Forrester and E. F. Phelps. *Proceedings of the Royal Society,* v. 187, Dec. 13, 1946, p. 430-439.

When the lubricant between two surfaces is unable to carry the load, we have a mixture of boundary friction and fluid lubrication. Relative advantages of two methods for obtaining relatively pure boundary friction and a method in which conditions of load, speed, and contact area are controlled to give little opportunity for fluid film formation. One specimen is driven at a fixed velocity and the second is applied by a dead load. Reproducibility of determination is about 10%. 14 ref.

21-6. Kinetic Friction in or Near the Boundary Region. II. The Influence of Sliding Velocity and Other Variables on Kinetic Friction in or Near the Boundary Region. P. G. Forrester. *Proceedings of the Royal Society,* v. 187, Dec. 13, 1946, p. 439-463.

Friction of several different combinations of materials was measured under three different conditions: dry, with excess of various lubricants, and with thin films of various lubricants applied in two ways. Results show that changes in friction with velocity may be derived from at least three sources. Effects of surface finish and of continual sliding or "running-in".

21-7. Conditions Leading to Fatigue Failure in Sleeve Bearings. R. W. K. Honeycombe. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint* 21, Dec. 1946, 18 p.

Requirements of a good bearing alloy. Influence of load, speed, temperature and composition on the fatigue failure of bearings. Influence of stresses superimposed on the fatigue stresses. Such stresses arise from the differential thermal expansions of bearing alloy and backing and in the noncubic tin and cadmium-base bearing alloys, also from the anisotropy of thermal expansion. Changes which have been made in modern practice to eliminate fatigue as a cause of bearing failure.

21-8. How to Pour Babbitt Bearings. K. T. MacGill. *Iron Age,* v. 159, Jan. 9, 1947, p. 50-51.

Simple, but effective, procedures for pouring babbitt to produce sound, dependable bearings. Discussion is an outgrowth of a survey conducted by the babbitt and bearing division of Joseph T. Ryerson & Son, Inc.

21-9. Measurement of Lubricant Film Strength in the Region of Boundary Friction. Part II. Victor A. Ryan. *Lubrication Engineering,* v. 2, Dec. 1946, p. 166-168.

Illustrates manner in which 1-min. transition load and 3-min. transition pressure tests were used in solution of problem of securing or producing a lubricant for a newly invented machine designed for splash oiling. Parts to be lubricated comprised several heavy cam and roller closing mechanisms operating at extreme pressures, dies for stamping and drawing metal, and very thin slides for moving the drawn stock. Lubricant had to function as an extreme pressure lubricant to prevent seizure between cams and rollers, as a drawing oil to prevent scuffing on the drawn stock and the dies, and as a light viscosity lubricant to oil the thin slides.

21-10. Bibliography of Papers and Books on Lubrication and Related Subjects Published in Germany During the Period 1940 to 1944. H. Blok. *Lubrication Engineering,* v. 2, Dec. 1946, p. 169-171.

Continues bibliography started in September issue. Completes 1942, 1943 and part of 1944. 99 ref.

21-11. Oleophobic Monolayers. I. Films Adsorbed From Solution in Nonpolar Liquids. W. C. Bigelow, D. L. Pickett and W. A. Zisman. *Journal of Colloid Science,* v. 1, Dec. 1946, p. 513-538.

Certain types of polar organic molecules are adsorbed from solutions in nonpolar solvents to form well-oriented monolayers on polished solid surfaces. Such monolayers impart both hydrophobic and oleophobic properties to the polished surfaces of a variety of metallic and nonmetallic solids and can be formed from a large variety of solvents. These films and the information obtained in this study are thought to be applicable to research on oiliness, wear prevention, emulsification, detergency, wetting and the inhibition of rusting of steel with polar compounds. 23 ref.

21-12. Aluminum Alloy Bearings. H. Y. Hunsicker. *Machine Design,* v. 19, Jan. 1947, p. 121-127.

Properties, applications, and design data on some of the most promising alloys. (Abstract of a paper for American Society for Metals at Atlantic City Metal Congress.)

21-13. Rolling Bearing Technique. Part II. R. K. Allan. *Machinery (London),* v. 69, Dec 9, 1946, p. 793-796.

Attention is directed to the question of rotational speed. (Abstract of the second part of paper for the Institution of Production Engineers, London.)

21-14. Ball Bushings. Lloyd H. Leonard. *Steel,* v. 120, Jan. 27, 1947, p. 74-75, 116.

Designed for round shafts, new unit provides advantages of low rolling friction with unlimited oscillating linear travel. Basic operating principle involves use of a series of balls rolling in continuous oblong tracks which supply necessary recirculation.

21-15. Metal Powder Self-Lubricating Bearings. A. J. Langhammer. *Iron and Steel Engineer,* v. 24, Jan. 1947, p. 93-95; discussion, p. 95-97.

In the oil-cushion bearing, the factors of gravity, pressure, etc., which in a solid bearing are a liability, cause the oil film to be generated and established. They operate under the principles of hydraulics rather than mechanics. Available in various sizes and designs and for many purposes.

21-16. Aluminum Alloys for Bearings. H. Y. Hunsicker and L. W. Kempf. *SAE Quarterly Transactions,* v. 1, Jan. 1947, p. 6-29; discussion, p. 29.

Tests on a number of aluminum alloys for antiscoring qualities, fatigue resistance, and mechanical stability in operation. Optimum bearing characteristics are found in alloys having a plastic, low-melting phase and a relatively hard phase uniformly distributed throughout an aluminum solid solution matrix of moderate hardness. Tin furnishes the best plastic constituent. Addition of silicon forms a hard constituent which increases strength markedly. Aluminum-tin-silicon-copper alloy, the most successful aluminum bearing alloy yet developed, may be used in centrifugal castings for large-size bearings or in pressure die castings and sheet for small thin-walled bearings. Manufacturing costs are low because of good machining characteristics and the high speed with which the material can be cut and finished.

21-17. How to Pour Bearings. K. T. MacGill. *Western Machinery and Steel World,* v. 38, Jan. 1947, p. 94-95.

Fundamentals for the guidance of shop men in pouring babbitt in relatively small quantities.

21-18. Drawing Compounds Improve Press Potentials. Sam Spring. *American Machinist,* v. 91, Feb. 13, 1947, p. 117-128.

What happens when sliding metal surfaces contact under high pressures. Friction, welding, composition and application of modern drawing lubricants, chemical and physical tests suitable for production shops and recommendations for specific metals.

21-19. Trends in Development and Application of Cutting Fluids. J. T. Beard, Jr. *Transactions of the American Society of Mechanical Engineers,* v. 69, Feb. 1947, p. 131-137; discussion, p. 137-138.

The influence that various metals have upon the types of cutting fluids

which are used, and especially on the role played by the hardness and cutting qualities of metals. Various groups of cutting tools, the influence of design of machine tools and the new nonpetroleum grinding compounds.

21-20. Selecting the Proper Cutting Fluid. *Iron Age,* v. 159, Feb. 20, 1947, p. 46.

Charts of cutting fluids for drilling, machine reaming, and tapping.

21-21. Selecting Correct Lubricants for Steel Mill Equipment. A. E. Hickel. *Steel,* v. 120, Feb. 24, 1947, p. 106, 110. 114.

Exact percentage, types of soap, additives, etc., required to obtain correct lubricants for steel plant equipment such as pressure systems, roll necks, bearings, mill tables, reduction gears, and pinions. Differences between worked and unworked penetration value should not exceed 40 points.

21-22. Coolant Is Purified in McGill's Flotation System. Ned Bailey. *Machine and Tool Blue Book,* v. 43, Feb. 1947, p. 182-184, 186, 188, 190, 192, 198, 200.

Analysis of the flotation method used at the McGill Manufacturing Co. to keep coolants constantly clean. Dangers of dirty coolants and the need for overcoming it. Method used and the benefits accruing to the company.

21-23. Strontium Greases. H. J. Worth and L. W. McClennan. *Oil and Gas Journal,* v. 45, March 1, 1947, p. 74, 76-78.

Preparation, properties, and uses.

21-24. Composition Bearings. W. A. Rankin. *Iron and Steel Engineer,* v. 24, Feb. 1947, p. 81-82; discussion, p. 82-83.

In addition to their use as roll neck bearings, composition bearings are proving themselves in many other applications.

21-25. The Use of Cutting Fluids in Precision Production. Gilbert C. Close. *Modern Machine Shop,* v. 19, March 1947, p. 134-138, 140, 142, 144, 146, 148, 150, 152.

Primary factors in the selection of cutting fluids and the application of the fluids under varying conditions of tools and materials.

21-26. Friction and Lubrication. F. P. Bowden and D. Tabor. *Annual Reports on the Progress of Chemistry for 1945, Chemical Society, London,* p. 20-46.

A review. 231 ref.

21-27. Design and Lubrication of Bearings. R. Schultz. *Lubrication Engineering,* v. 3, Feb-March 1947, p. 7-9.

Design considerations for bearings in which the lubricant is supplied intermittently. Illustrated.

21-28. What Is a Lubricant? Henry E. Mahncke. *Lubrication Engineering,* v. 3, Feb-March 1947, p. 10-14.

Discusses some of the physical and chemical phenomena involved in the mechanism of lubrication. Existing ideas concerning viscosity and oiliness are reviewed and the need for more detailed knowledge of these properties is indicated.

21-29. Latest Developments in Engine Bearings. Part I. P. M. Heldt. *Automotive and Aviation Industries,* v. 96, March 1, 1947, p. 28-31, 58, 60.

Materials and types; copper-lead, aluminum, and silver; micro and grid bearings.

21-30. On the Action of Cutting Oils. G. P. Brewington. *Journal of Applied Physics,* v. 18, Feb. 1947, p. 260.

Pros and cons of present theories.

21-31. Bearings Keep the Wheels Turning. Arthur Q. Smith. *Industrial Gas,* v. 25, Feb. 1947, p. 11-14.

Operations at Timken Roller Bearing Co., Canton, Ohio.

21-32. The Rheology of Lubricants. R. B. Dow. *Journal of Colloid Science,* v. 2, Feb. 1947, p. 81-91.

Recent developments in theory and practice, including the silicone lubricants, the fluorocarbon componds, oiliness additives, e.p. additives, oxidation inhibitors, and high-pressure effects in lubricants. 30 ref.

21-33. Low-Temperature Cooling in the Machining Process of Metals. G. Pahlitzsch. *Headquarters Air Materiel Command Translation F-TS-1065-RE,* Feb. 1947, 21 p.

A calorimetric analysis of the thermal stress occurring during the machining of metals and the effect of reduction of the lubricant temperature to near-freezing on the structural and mechanical properties of both tools and materials. (Translated from *V.D.I.-Zeitschrift,* v. 88, 1944.)

21-34. Physico-Chemical Investigation of the Cooling Properties of Liquids Used During Machining of Metals. N. A. Pleteneva and P. A. Rebinder. *Bulletin of the Academy of Sciences of U.S.S.R.,* Section of Technical Sciences, no. 12, 1946, p. 1823-1829. (In Russian.)

Effect of variations in the rate of flow of coolant (aqueous solution of sodium oleate) showed that the cooling action decreased rather abruptly when the rate was decreased below a certain critical value. A theoretical explanation of these results.

21-35. Geometrical and Metallurgical Changes in Steel Surfaces Under Conditions of Boundary Lubrication. B. W. Sakmann. *Journal of Applied Mechanics,* v. 14, March 1947, p. A43-A52.

Changes taking place in metal surfaces during running-in tests. The surfaces were lubricated during the tests, which simulated conditions en-

countered in industrial practice. In all tests the geometry of the surfaces was changed. Different tests for the identification of the nature of the transformation are discussed. Heat-conductivity calculations made it possible to estimate the temperature reached during running-in. A tentative explanation of the origin of the transformations is presented.

21-36. Sliding Friction Under Extreme Pressures. Part I. *Journal of Applied Mechanics,* v. 14, March 1947, p. A68-A70.

Extended discussion of paper by S. J. Dokos, published in June 1946 issue and author's reply. M. Eugene Merchant presents a mathematical analysis of static and kinetic friction based on Mr. Dokos' data.

21-37. Analysis of Centralized Lubricating Systems. James P. Gravenstreter. *Iron and Steel Engineer,* v. 24, March 1947, p. 81-89, 97; discussion, p. 97.

Nine systems of centralized lubrication.

21-38. Oil Purification, Filtration and Reclamation. Brian Corrigan. *Iron Age,* v. 159, April 3, 1947, p. 56-62.

The characteristics of used oil; the various methods which may be used for purifying, filtering, or reclaiming it; advantages and disadvantages of each method.

21-39. Advances in Ball and Roller Bearings. Fred W. Mesinger. *Engineers' Digest (American Edition),* v. 4, March 1947, p. 98.

Wartime advances in instrument bearings; extra light, low weight bearings; high-temperature bearings; sealed ball bearings; improved greases for bearing lubrication; improved protection of bearings in shipment; bearing standardization.

21-40. Latest Developments in Engine Bearings. Part II. P. M. Heldt. *Automotive and Aviation Industries,* v. 96, April 1, 1947, p. 34-37, 62.

Production, inspection, and test methods for aircraft-engine bearings.

21-41. An Electron Microscope Study of Lubricating Greases. B. B. Farrington and D. H. Birdsall. *Institute Spokesman,* v. 11, April 1947, p. 4-10.

Micrographs presented show, in considerable detail, the fibrous structure of various types of metal-soap greases. This type of structure is verified for all types so far examined (with the possible exception of the aluminum-base greases).

21-42. Lubricating Properties of Molecular Layers of Stearic Acid and Calcium Stearate on Metal Surfaces. J. N. Gregory and J. A. Spink. *Nature,* v. 159, March 22, 1947, p. 403.

Friction-temperature measurements of layers of calcium stearate and stearic acid on various metals. Results discussed from a theoretical point of view.

21-43. Centralized Lubrication in Industry. E. I. Pfaff. *Iron and Steel Engineer,* v. 24, April 1947, p. 77-81; discussion, p. 81-84.

Use of systems for miscellaneous heavy steel-mill equipment.

21-44. Possible Causes of Failure of High Speed Engine Bearings. B. C. Kroon. *Engineers' Digest (American Edition),* v. 4, April 1947, p. 192-193.

Bearing failure in high-speed diesels. A mathematical analysis of the relationship between the specific bearing pressure, engine speed, oil pressure differential in the bearing, and oil viscosity. Conclusions resulting from an investigation of the bearings of two four-stroke diesels operating at 2000 and 1200 r.p.m., respectively, and one two-stroke diesel running at 2000 r.p.m. (Abstracted from *De Ingenieur,* v. 59, no. 3, Jan. 17, 1947, p. 1-8.)

21-45. Lubrication of Bearings. *Product Engineering,* v. 18, May 1947, p. 125-127.

The dependence of pressure on viscosity, adsorbed heat, and the effect of additives in lubricating oil. (From "Bearing Friction and Border Surface Phenomena" by S. Kieskalt. *V.D.I. Zeitschrift,* May 29, 1943, p. 321.)

21-46. Lubrication in Iron and Steel Works Engineering. H. J. Knight. *Journal of the Iron and Steel Institute,* v. 155, March 1947, p. 423-430; discussion, p. 431-441.

American practice in lubrication of blast furnaces, gas regulators, electrical equipment, gears and pinions of rolling mills, backup roll neck. Types of oils used and amount of oil.

21-47. Colloidal Graphite in the Metal Industry. *Metallurgia,* v. 35, April 1947, p 301-302.

Application of colloidal graphite facilitates such operations as die casting, extrusion, stamping, wire drawing; its use reduces maintenance costs, especially when applied to parts operating at elevated temperatures.

21-48. Distribution of Bearing Reactions on a Rotating Shaft Supported on Multiple Journal Bearings. S. S. Manson and W. C. Morgan. *National Advisory Committee for Aeronautics Technical Note No. 1280,* May 1947, 16 p.

An analytical treatment of the problem which differs from others in common use in that account is taken of hydrodynamic effect of oil film between journals and bearings.

21-49. Smallest Bearings Are Cold Pressed. *Production Engineering & Management,* v. 19, May 1947, p. 92.

Tiny balls for fountain pens, untouched by hands during manufacture, are inspected, gaged and packaged under rigidly controlled temperature conditions. Special process gives the balls a satin-like finish to give lubricants

and inks a greater surface cohesion. This surface consists of minute scratches on the balls.

21-50. Electron Diffraction Study of Oleophobic Films on Copper, Iron and Aluminum. L. O. Brockway and J. Karle. *Journal of Colloid Science,* v. 2, April 1947, p. 277-287.

Results of a fundamental study of the above films. New procedures which had to be developed. Stearic acid and n-octadecylamine were the film liquids investigated.

21-51. Roll-Neck Bearin . *Journal of the Iron and Steel Insti e,* v. 155, April 1947, p. 593-608; discussion, p. 608-620.

Papers read at the afternoon session of the second meeting of the Iron and Steel Engineers Group of the Iron and Steel Institute: White-metal bearings applied to hot steel rolling mills, by J. M. Borland. Roller bearings, by L. R. Pearson. Synthetic-resin bearings, by F. W. Jones. Oil-film-type bearings, by G. R. Walshaw.

21-52. Preparing Bearing Shells for Babbitting. A. A. Goodman. *Metal Progress,* v. 51, May 1947, p. 776.

Serrated bore is now used to aid bonding of babbitted bearing liners to steel and bronze shells. This practice saves both time and babbitt metal in comparison with older method in which slots were cut in the shell bore.

21-53. Composition, Control and Selection of Coolants for Working Metals. E. L. Bastian. *Steel,* v. 120, May 19, 1947, p. 82-83, 117, 120, 124.

Important group of water mixtures or solutions used as coolants in metal-working. Compositions of typical water soluble or emulsifiable materials, the preparation of aqueous coolants for use, their care, maintenance, and control in use, and the relative suitability of water coolants versus other types of fluids.

21-54. Smooth Surfaces Increase Plain-Bearing Capacity. E. L. Hemingway. *American Machinist,* v. 91, June 5, 1947, p. 92-95.

Tests with recording wattmeter show smooth surfaces, will carry heavier loads, run cooler, can be fitted to closer tolerances, and suffer much less wear.

21-55. Lead-Base Babbitt Alloys. Part II. Fatigue and Wear Properties. Henry P. George. *Product Engineering,* v. 18, June 1947, p. 138-141.

Results of simulated service tests on ten lead-base babbitt bearing analyses are compared to those on a tin-base babbitt bearing. The load carrying ability of bearings of the ten materials are given. Results of fatigue tests on babbitt-steel strips.

21-56. The Ball Bearing. T. B. Sansom. *Machinery (London),* v. 70, May 22, 1947, p. 541-546.

Factors governing performance under various operating conditions.

21-57. Bearing Metals. Modern Developments for the High-Speed Diesel Engine. P. T. Holligan. *Metal Industry,* v. 70, May 23, 1947, p. 375-377; May 30, 1947, p. 402-404.

Properties required, structure, thickness of lining, cadmium base and aluminum base metals, and lead-bronze and copper-lead bearing alloys. (To be concluded.)

21-58. The Hydrodynamic Lubrication of Finite Sliders. Charles P. Boegli. *Journal of Applied Physics,* v. 18, May 1947, p. 482-488.

Two approximations are made in the solution of Reynolds' lubrication equation for the case of a finite slider. These approximations lead to a series of equations that are easy and rapid to use for flat sliders, and which are also applicable to curved sliders. Examples of their use are presented, and a number of calculations are made to determine the range of slider proportions to which they may be applied with sufficient accuracy.

21-59. Latest Trends in Machine Tool Lubrication. J. R. Keen. *Lubrication Engineering,* v. 3, May-June 1947, p. 53-54.

A general discussion.

21-60. Additives in Lubricating Greases. Gus Kaufman. *Lubrication Engineering,* v. 3, May-June 1947, p. 55-61.

The importance of field tests in evaluating greases containing additives. Several test procedures.

21-61. Specifications—Their Use and Misuse. Melville Ehrlich. *Lubrication Engineering,* v. 3, May-June 1947, p. 62-64.

A general discussion referring to lubricants.

21-62. Bits and Pieces. *Metal Progress,* v. 51, June 1947, p. 969-971.

Model sleeve and ring bearings, by John Boyd. Computations of tensile results, by J. Dunlap McNair. Identifying metallographic specimens, by M. H. Kalina. Rapid polish for silver plate, by Dennis R. Turner. Tumbler for small tool bits, by James McGuire. Simplified Jominy test piece, by Harry F. Ross. Photomacrographic procedure, by C. Patrick Kenyon.

21-63. Bearing Metals—Modern Developments for the High Speed Diesel Engine. P. T. Holligan. *Metal Industry,* v. 70, June 6, 1947, p. 419-420.

Silver bearings and bearing shell materials. (Concluded.)

21-64. Bearings Made From Steel Wool. *Iron Age,* v. 159, June 19, 1947, p. 63.

Landing gear strut bearings are made by impregnating steel wool with copper, or related material, to form a closely woven and relatively heavy section or a relatively porous bearing.

These bearings resist both high temperatures developed by friction, and extreme cold. They also have all desired compression and friction characteristics and can be attached to adjoining parts by brazing.

21-65. Kinetic Boundary Friction. J. R. Bristow. *Proceedings of the Royal Society,* v. 189, March 1, 1947, p. 88-102.

In order to determine the fundamental principles of boundary lubrication and the nature of boundary lubricating layers, curves of boundary friction vs. velocity, using various sliding surfaces, were determined for a number of lubricants. Dependence of kinetic boundary friction on molecular weight is shown for a series of esters of the fatty acids, on percentage of fatty oil in a compounded lubricant and on temperature for a pure substance and a mineral oil. 25 ref.

21-66. Engineering Smoothness Into Ball and Roller Bearings. T. W. Morrison. *Electrical Manufacturing,* v. 40, July 1947, p. 104-105, 210.

How to prevent noise, a secondary effect of vibration, by avoidance of surface roughness, dirt, denting, eccentricity, and excessive tightness.

21-67. Design Factors Rule Bearing Fabrication. *SAE Journal,* v. 55, July 1947, p. 66-67.

Fabrication by the tubing method and by the strip process. (Digest of "Sleeve Bearing Lining Materials", by W. E. Thill.)

21-68. Soluble Oil Coolants. L. B. Johnson. *Steel,* v. 121, July 7, 1947, p. 110, 113, 142.

Their use in various machining operations on ferrous and nonferrous material. Data and formulas given are based on current use in large and small plants and on a wide range of work.

21-69. Metals Grinding Machinery Lubrication. *Lubrication,* v. 33, July 1947, p. 69-80.

Illustrated by diagrams and photographs.

21-70. The Influence of Lubricating Oil on Cylinder Wear. B. M. Berry. *Society of Automotive Engineers Preprint,* 1947, 2 p.

A general discussion; wear testing procedures.

21-71. Synthetic Resin Bearings. F. W. Jones. *Plastics (London),* v. 11, July 1947, p. 367-371.

Bearings for steel mills. (Reprinted from *Journal of the Iron and Steel Institute.*)

21-72. How to Work With Cutting Fluids. Harold L. Flynn. *American Machinist,* v. 91, July 31, 1947, p. 89-96.

Cutting-fluid action; types; selection and application; handling.

21-73. The Mechanism of Cutting Fluid Action. Milton C Shaw. *Journal of Applied Physics,* v. 18, July 1947, p. 683.

Arguments supporting the hypothesis that certain effective metal-cutting fluids react chemically with the metal during the cutting operation.

21-74. Hydrostatic Lubrication. Dudley D. Fuller. *Machine Design,* v. 19, Aug. 1947, p. 115-120.

Application of hydrostatic lubrication to step bearings.

21-75. Centralized Oil Reclamation and Distribution. *Steel,* v. 121, Aug. 11, 1947, p. 83-84, 105-106, 108.

System in use at International Harvester's West Pullman ball-bearing plant.

21-76. Use of Wire Drawing Compounds. E. L. H. Bastian. *Wire and Wire Products,* v. 22, Aug. 1947, p. 577-580.

The development of improved wire-drawing compounds and their application.

21-77. Les Coussinets En Aluminium. (Aluminum Bearings.) Michel Goret. *Revue de l'Aluminium,* v. 24, no. 133, May 1947, p. 155-169.

A history of the use of aluminum alloys for bearings stressing past French work. Recent tests on bearings made of three French and two American alloys; properties and applications.

21-78. The Frictional Properties of Some Lubricated Bearing Metals. P. G. Forrester. *Journal of the Institute of Metals,* v. 73, June 1947, p. 573-589.

Study of the kinetic friction of four different bearing alloys against lubricated steel at low sliding velocities. The friction observed for any particular alloy depends on sliding velocity, temperature, and the surface finish of the steel, though the effects of these factors are not independent. The chief differences between the four alloys are in the extent of fluid friction present under a given set of conditions. Tin and lead-base babbitts promote fluid friction to a much greater extent than copper-lead alloys, while cadmium-nickel has, in general, intermediate properties. 26 ref.

21-79. Scoring and Burnishing in Bearings. V. H. Brix. *Aircraft Engineering,* v. 19, July 1947, p. 218-221.

Investigations into these two phenomena associated with the lubrication problem.

21-80. Surface Activity of Lubricant. J. M. Wilson. *Iron and Steel Engineer,* v. 24, Aug. 1947, p. 46-49; discussion, p. 50-54.

The phenomena of surface activity may provide the answers which will explain lubricant behavior. Relation to some of the performance aspects of

lubricants. Behavior of lubricants and their suitability for various applications.

21-81. Structural Viscosity as the Cause of Lubricating Properties. H. Umstatter. *Engineers' Digest (American Edition),* v. 4, June 1947, p. 264-267.

The theory of structural viscosity. The hydrodynamic theory of bearing friction, which regards viscosity as dependent only on temperature and pressure, does not fully account for the experimental facts. Structural viscosity results from the effects of viscosity as well, and is a common property of all liquids. A structural viscometer is used in the plotting of yield curves of lubricants. (Translated and condensed from *Die Technik,* v. 1, July 1946, p. 46-52.)

21-82. Babbitt Alloys for Plain Bearings. P G. Forrester. *Engineering,* v. 164, Aug. 22, 1947, p. 184-185.

The fundamental requirements of a bearing alloy. Babbitt and similar alloys have considerable advantages from a frictional point of view. The factors upon which optimum performance depends. 17 ref. (To be continued.)

21-83. A Molecular Theory of Friction. V. S. Shchedrov. *Journal of Technical Physics (U.S.S.R.),* v. 17, no. 5, 1947, p. 537-542. (In Russian.)

A mathematical analysis of forces involved in friction between two surfaces, for conditions in which the areas of contact between the microprojections of the two contacting surfaces may be considered as circular.

21-84. Lubricating Wire Rope. J. A. Rigby. *Steel,* v. 121, Sept. 8, 1947, p. 88, 91.

Recommendations for choice and use of lubricants.

21-85. Machine Tool Lubrication From the User's Point of View. W. H. McKaig. *Lubrication Engineering,* v. 5, Aug-Sept. 1947, p. 43-44.

Recommended procedures for minimizing wear of machine tools.

21-86. How to Select the Best Oils for Hydraulic Equipment. D. C. Miner. *Machine and Tool Blue Book,* v. 43, Sept. 1947, p. 328-332, 334, 336-337.

There are two bases from which to evaluate oils for use on hydraulic equipment. Both methods are discussed from the standpoint of decreasing maintenance costs and increasing service life of equipment.

21-87. Babbitt Alloys for Plain Bearings. P. G. Forrester. *Engineering,* v. 164, Aug. 29, 1947, p. 208-209.

The fundamental requirements of a bearing alloy show that babbitt and similar alloys have considerable advantages from a frictional point of view. (To be continued.)

21-88. 18,000 Ways to Fight Friction. H. O. Smith. *Scientific American,* v. 177, Oct. 1947, p. 149-153.

Various types of bearings.

21-89. Cutting Fluids, Chipbreakers, etc. W. A. Carter. *Institution of Mechanical Engineers Proceedings,* v. 155, 1946, p. 261-263; discussion, p. 267-291.

A general discussion. (War Emergency Issue No. 20.)

21-90. Torrington Four-Row Roll Neck Bearings. *Bearing Engineer,* v. 7, July-Aug. 1947, p. 5.

Recommended factors for installation and operation of rolling-mill bearings.

21-91. Seizing of Certain Metals at 750° F. *Materials & Methods,* v. 26, Sept. 1947, p. 113.

Test results for combinations of 21 different bearing metals and alloys.

21-92. Evaluation of Water Resistance Properties of Lubricating Greases. T. G. Roehner and E. S. Carmichael. *Institute Spokesman,* v. 11, Sept. 1947, p. 4-7, 12-13, 16-17. *Oil and Gas Journal,* v. 46, Oct. 25, 1947, p. 107, 109, 111.

Various test procedures for the water resistance properties and also for rust-preventive properties. Comparative test data indicate the value of the various methods.

21-93. Plain Bearings. *Automobile Engineer,* v. 37, Sept. 1947, p. 325-335.

Products and manufacturing methods of British firm.

21-94. Lubrication in Forging Operations. *Lubrication,* v. 33, Sept. 1947, p. 97-108.

Lubrication systems for typical machinery used in the above.

21-95. An Electrical Study of Boundary Lubrication. V. H. Brix. *Aircraft Engineering,* v. 19, Sept. 1947, p. 294-297.

Use of electrical resistance measurements in this study. It was possible to obtain smooth curves for the voltage-current relationships at various loads and speeds. Conclusions are drawn from the results concerning the mechanism of boundary lubrication and the effects of "mild E. P." additives and of bearing metals.

21-96. Babbitt Alloys for Plain Bearings. P. G. Forrester. *Engineering,* v. 164. Sept. 5, 1947, p. 234-235.

The different manufacturing procedures.

21-97. Automotive Bearings From the Service Viewpoint. H. W. Luetkemeyer. *SAE Quarterly Transactions,* v. 1, Oct. 1947, p. 612-616, 625.

The three primary causes of bearing failures are listed as extreme increases in rated engine output without fundamental design changes, improper installation, and more severe use of the

engine than its design permits. Advances leading to increased performance of many engine parts. Factors which affect bearing capacity, performance, and life. Bearing installation procedure. (Presented at S.A.E. National Transportation Meeting, Chicago, April 18, 1947.)

21-98. Lubrication in Iron and Steel Works Engineering. H. J. Knight. *Blast Furnace and Steel Plant,* v. 35, Oct. 1947, p. 1235-1240.

Information obtained on trip to America. (Paper read before British Iron and Steel Institute.)

21-99. Lubrication in Drawing Operations—A Symposium. E. A. Evans, H. Silman, and H. W. Swift. *Sheet Metal Industries,* v. 24, Oct. 1947, p. 1995-2002.

The functions and requirements of lubricants for drawing and properties of the different types. Results of an experimental comparative test program for different lubricants. (To be continued. Presented at Autumn Conference of Sheet and Strip Metal Users' Technical Assoc.)

21-100. Lubrication of Grinding Machinery. A. F. Brewer. *Steel,* v. 121, Oct. 27, 1947, p. 74-76, 95-96.

Lubricating systems and selection of lubricants.

21-101. Two Heat Resisting Lubricants. G. L. Sumner. *Westinghouse Engineer,* v. 7, Nov. 1947, p. 188-189.

Molybdenum sulphide and boron nitride have achieved success alone and in combination with other materials in solving problems of lubrication of moving parts subjected to elevated temperatures.

21-102. What to Look for in Hydraulic Oils. I. Anthony J. Zino, Jr. *American Machinist,* v. 91, Nov. 6, 1947, p. 93-96.

Six service properties which must be considered in selecting oils for satisfactory results are: viscosity; viscosity index; demulsibility; oxidation stability; lubricating value; rust and corrosion preventive qualities.

21-103. Methods of Wear Testing of Bearing Alloys on the Amsler Machine. M. Kh. Drits. *Factory Laboratory (U.S.S.R.),* v. 13, June 1947, p. 757-760. (In Russian.)

Experiments on the effects of surface cleanliness, lubrication, duration of test, and pressure applied, on coefficient of friction and wear of various standard bearing alloys.

21-104. Friction at High Sliding Velocities. Robert L. Johnson, Max A. Swikert, and Edmond E. Bisson. *National Advisory Committee for Aeronautics Technical Note No. 1442,* Oct. 1947, 41 p.

Fundamental friction knowledge extended to include sliding velocities encountered in rolling-contact bearings and reduction gears of aircraft power plants. Experiments were conducted with a kinetic-friction apparatus consisting basically of an elastically restrained spherical rider sliding on a dry or lubricated rotating disk with steel specimens over a range of speeds between 50 and 6600 ft. per min. with loads from 108,000 to 255,000 psi. initial Hertz surface stress. Experiments were supplemented by standard physical, chemical, and metallurgical equipment and techniques. 18 ref.

21-105. Changes Found on Run-In and Scuffed Surfaces of Steel, Chromium Plate, and Cast Iron. J. N. Good and Douglas Godfrey. *National Advisory Committee for Aeronautics Technical Note No. 1432,* Oct. 1947, 28 p.

X-ray and electron-diffraction techniques, microhardness determinations, and microscopy were used. Surface changes were found to include three classes: chemical reaction, hardening, and crystallite-size alteration. 24 ref.

21-106. Selecting the Antifriction Bearing for a Limited Space. *Electrical Manufacturing,* v. 40, Nov. 1947, p. 82-86, 156, 158, 160.

Selection of ball and roller bearings.

21-107. Lubrication in Drawing Operations; a Symposium. (Concluded.) E. A. Evans, H. Silman, and H. W. Swift. *Sheet Metal Industries,* v. 24, Nov. 1947, p. 2209-2213, 2216.

Gives results of evaluation of different lubricants for drawing of mild steel, brass, and aluminum. Various chemical methods for degreasing or surface preparation. The electro-cleaning process. (Presented at the Autumn Conference of the Sheet and Strip Metal Users' Technical Assoc.)

21-108. Soluble Oils for Cutting and Grinding Operations. C. M. Larson. *Iron and Steel Engineer,* v. 24, Nov. 1947, p. 73-76; discussion, p. 76-77.

Types and applications. (Presented at A.I.S.E. Annual Convention, Cleveland, Oct. 4, 1946.)

21-109. Lubrication in Drawing Operations. E. A. Evans, H. Silman, and H. W. Swift. *Engineering,* v. 164, Nov. 7, 1947, p. 454-455.

Condensed from *Sheet Metal Industries,* v. 24, Oct. 1947, p. 1995-2002; Nov. 1947, p. 2209-2213, 2216 (see item 21-107). (Presented at Autumn Conference of Sheet and Strip Metal Users' Technical Assoc., London, Sept. 25, 26, 1947.)

21-110. Importance of Lubrication in Forging Operations. A. F. Brewer and J. C. Van Gundy. *Steel,* v. 121, Dec. 1, 1947, p. 92-95, 102, 104, 106, 109.

Need for efficient lubrication in maintenance of forging equipment. Design of machinery components in relation to heat, pressure, water, and lubricant contamination.

21-111. Dry Friction of Metals as Affected by Surface Finish and Surface Coatings. N. Ludwig. *Engineers' Digest (American Edition),* v. 4, Nov. 1947, p. 516-517.

Apparatus for measuring sliding frictional resistance by use of a test cube pressed against a plane surface. Effect of surface finish was determined for four metals or alloys and for four grades of mechanical smoothness: rough machined; fine machined; ground; and polished. The frictional resistance of ten different surface coatings of either phosphated or plated types was also determined. (Translated and condensed from *Die Technik,* v. 2, April 1947, p. 166-170.)

21-112. Research Into the Laws of Heat Dissipation in Journal Bearings. Ch. Hanocq. *Engineers' Digest (American Edition),* v. 4, Nov. 1947, p. 530-533.

Experiments which resulted in new and more accurate formulas for the design of bearings. Influences of bearing metal, self-alignment, film lubrication, and dimensional relationships reduced to mathematical expressions. A short, self-aligning bearing gives best results. (Translated and condensed from *Revue Universelle Des Mines,* v. 3, 1947, p. 245-258.)

21-113. Brinelling of Ball and Roller Bearings. *Product Engineering,* v. 18, Dec. 1947, p. 127-128.

Ball and roller-bearing failures can result from light, high-frequency impacts repeatedly striking the same area in the periphery of the bearing races. Calculations from experiences in reducing bearing failures caused by vibrations. (Translated and condensed from "A Study of Rhythmic Phenomena in Roller Bearings", *Schweiz. Technische Zeitschrift,* v. 46, Nov. 1946.)

21-114. Pouring Better Babbitted Bearings. Wm. H. Parché. *Industry and Power,* v. 53, Dec. 1947, p. 95-96, 110, 113-114.

Recommended procedures.

21-115. Care and Control of Coolants. H. P. Wilkinson. *Screw Machine Engineering,* v. 9, Dec. 1947, p. 47-50.

21-116. Sliding Friction of Ball Bearings of the Pivot Type. H. Poritsky, C. W. Hewlett, Jr., and R. E. Coleman, Jr. *Journal of Applied Mechanics,* v. 14, (*Transactions A.S.M.E.,* v. 69), Dec. 1947, p A261-A268.

While ideally, pivot and race surfaces can touch the ball surfaces only at mathematical points, these surfaces actually flatten due to elastic compression so that contact occurs over a finite area. As a result of this flattening, even the most precise and flawless ball bearings possess definite friction. This source of unavoidable friction is analyzed, and the frictional torque due to it is computed for an individual ball, for the whole bearing, and for both bearings holding a rotor or gimbal. (Presented at Meeting of Applied Mechanics Division of A.S.M.E., Schenectady, N. Y., June 23-25, 1947.)

21-117. Antifriction Bearings. L. E. Browne. *Steel,* v. 121, Nov. 17, 1947, p. 90-91, 126, 128; Dec. 1, 1947, p. 88-89, 114, 116, 120; Dec. 8, 1947, p. 96-98, 100, 102; Dec. 29, 1947, p. 50-53.

Fundamentals of bearing practice, including design considerations, and some typical industrial applications Some typical applications on milling, boring, turning, and grinding equipment. Needle bearings and the part they play in the design of various types of industrial machinery. Various bearings used in railroad rolling stock. (To be continued.)

21-118. The Effect of Cutting Fluids on Drilling Thrust and Torque. John G. Floden. *Tool Engineer,* v. 19, Dec. 1947, p. 21-24.

An investigation of the action of coolants in conjunction with cutting speeds and feeds.

21-119. New Developments in Babbitting Methods. J. T. Clenny. *Iron Age,* v. 160, Dec. 25, 1947, p. 62-69.

Many new methods, with particular emphasis on cleaning and pickling operations and on the metallurgical considerations involved.

21-120. Abrasive Wear of Surfaces. V. S. Shchedrov. *Journal of Technical Physics (U.S.S.R.),* v. 17, Sept. 1947, p. 1019-1026. (In Russian.)

A theoretical, mathematical development. Formulas for determination of total wear per unit of time.

21-121. Influence of Water on the Lubrication of Metals. E. D. Tingle. *Nature,* v. 160, Nov. 22, 1947, p. 710.

Results of a study of mechanism of lubrication show that chemical reaction, with the formation of a soap film, is necessary for the effective lubrication of metal surfaces by fatty acids. The presence of water as well as oxygen is necessary for effective lubrication.

21-122. Radioactive Tracers in Friction Studies. J. T. Burwell, Jr. *Nucleonics,* v. 1, Dec. 1947, p. 38-50.

New results, experimental techniques, and principles of friction studies with radioactive isotopes. Applications to study of lubricants, metal wear, and other well-known but unexplained phenomena. 18 ref.

21-123. Life Testing of Plain Bearings for Automotive Engines. E. T. Johnson. *Symposium on Testing of Bearings (American Society for Testing Materials),* 1947, p. 2-15; discussion, p. 15-18.

Special bearing test machine developed and used by Chrysler Corp. The materials are evaluated by determining performance in an actual bearing and conclusions are drawn from tests run under a constant loading cycle with higher-than-service loads.

21-124. Fatigue Testing Machines for Ball and Roller Bearings. Thomas Barish. *Symposium on Testing of Bearings (American Society for Testing Materials),* 1947, p. 19-33; discussion, p. 34.

Various machines and the effects of different factors on the results obtained.

21-125. Metallographic Observations of Ball Bearing Fatigue Phenomena. A. B. Jones. *Symposium on Testing of Bearings (American Society for Testing Materials),* 1947, p. 35-48; discussion, p. 49-52.

Results of metallographic investigation of fatigue phenomena for the high-carbon, Cr steel designated as S.A.E. 52100.

21-126. Fatigue Testing of Roller Bearings. H. R. Gibbons. *Symposium on Testing of Bearings (American Society for Testing Materials),* 1947, p. 53-59; discussion, p. 60-61.

A brief résumé of experiences over the past 30 years or so in the development of bearing-test machines and methods for rating roller bearings at Hyatt Bearing Div., General Motors Corp. Need for more fatigue information.

21-127. Testing of Bearings Under Controlled Load. J. M. Frankland and C. B. Innes. *Symposium on Testing of Bearings (American Society for Testing Materials),* 1947, p. 62-65.

Machine developed for testing highly loaded, planetary, gear-reduction systems used in airplanes, where weight savings are of primary importance.

21-128. Nickel-Antimony-Lead-Copper Bearing Alloys. John T. Eash. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 171-182; discussion, p. 182-184.

Previously annotated from *Metals Technology,* Dec. 1945, T.P. 1937, in R.M.L., v. 3, 1946.

21-129. Silver-Thallium Antifriction Alloys. F. R. Hensel. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 399-414.

Previously annotated from *Metals Technology,* Oct. 1945, T.P. 1930, in R.M.L., v. 2, 1945.

SECTION XXII

WELDING

Brazing; Soldering; Flame Cutting; Riveting

22-1. Repair Welding of Steel Castings. Orville T. Barnett. *Foundry,* v. 75, Jan. 1947, p. 74-76, 202-203, 206, 208, 210.
Removal of defects and preparation for welding; establishment of welding procedure; adoption of suitable electrode type.

22-2. Designing for Silver Brazing With Induction Heating. John B. Ross. *Iron Age,* v. 158, Dec. 26, 1946, p. 62-65.
In designing joints to be silver brazed, attention must be paid to the amount of clearance between the mating parts. Factors influencing this clearance, and the precautions to be observed in selecting coils to be used for induction heating of the brazing area.

22-3. Pressure Welding of Aluminum Alloys. H. Herrmann. *Machinery (London),* v. 69, Nov. 28, 1945, p. 692-695.
Method of pressure welding that was developed at the Junkers-Flugzeugund Motorenwerken A.G. Mechanical application of hammer welding to production of cooler element.

22-4. Hints on Bronze Surfacing. *Linde Tips,* v. 26, Jan. 1947, p. 20-21.
Time-saving methods and finishing tools used in building up rings; shaping built-up gear teeth; rebuilding axles.

22-5. Add Another Blowpipe and Increase Profits. *Linde Tips,* v. 26, Jan. 1947, p. 22-23.
Production operations where two or more blowpipes are used to increase machine output.

22-6. Why Use E6012 Electrodes? Orville T. Barnett. *Steel,* v. 119, Dec. 30, 1946, p. 73, 106, 108.
Why this type is in greater demand today than other electrodes; ductility; X-ray soundness; penetration; freedom from undercut; faster welding of light sections with large diameter electrodes.

22-7. Welding Alloy Steel Piping. Eric R. Seabloom. *Heating, Piping & Air Conditioning,* v. 18, Dec. 1946, p. 79-83.
How to weld, braze, and solder chromium-nickel types of stainless steel.

22-8. Fixtures Make Welders Flexible. Part II. Ed Reilly. *American Machinist,* v. 91, Jan. 2, 1947, p. 74-75.
The range of work that can be readily assembled by standard welders is limited only by the designer of jigs and fixtures.

22-9. Fabricating Sheet Metal Parts of Jet Engines. Harold A. Knight. *Materials & Methods,* v. 24, Dec. 1946, p. 1461-1465.
Parts include combustion chambers, ducts and cones. Stainless steel, usually Type 347, was the preponderant material used for parts in the I-40 jet engine, which powered the famous Shooting Star jet plane. Inconel was used for liners in the combustion chambers and bronze wire screen and aluminum foil were used for insulation. Four types of welding used; gives welding details.

22-10. The Argon-Arc Process for Welding Magnesium and Aluminum Alloys and Stainless Steel. R. E. Dore. *Sheet Metal Industries,* v. 23, Dec. 1946, p. 2405-2415, 2420.
Equipment; setting up the equipment; welding with direct current; alternating current welding; comparison of a.c. and d.c. welding; welding technique for magnesium; welding of stainless steel; automatic argon-arc welding; results of welding tests on magnesium alloys; results obtained on other metals.

22-11. The Welding of Nonferrous Metals. Part VIII. (Continued.) E. G. West. *Sheet Metal Industries,* v. 23, Dec. 1946, p. 2416-2420.
Welding procedures; welding of tubes; finishing of copper welds; testing and inspecting copper welds. (To be concluded.)

22-12. Riveting Aluminum Ships. Harold J. Andrews. *Fasteners,* v. 3, no. 5, 1946, p. 4-5.

Ten-year test of experimental hull section in Chesapeake Bay salt water shows that cold driven 535 rivets are just as resistant to corrosion as those driven hot.

22-13. Shape-Cutting With a Portable Machine. *Linde Tips,* v. 26, Jan. 1947, p. 5-12.

Aids for cutting irregular shapes with the CM-16.

22-14. Weldability of Aluminum. G. G. Landis. *Light Metal Age,* v. 4, Dec. 1946, p. 8-13.

Some of the factors affecting efficiency in welding of pure aluminum and aluminum alloys. Mechanical properties of commercial weldable aluminum alloys and general procedures using a metallic arc. Manual welding of aluminum structures and typical applications of automatic carbon-arc welding.

22-15. Welding in Warship Research Work. *Welder,* v. 15, July-Sept. 1946, p. 49-50.

Outlines scope of research carried on at the Naval Construction Research Establishment at Rosyth, England.

22-16. Electric Arc Welding in H.M. Dockyards. *Welder,* v. 15, July-Sept. 1946, p. 51-55.

A crankshaft repair is described in detail. (To be continued.)

22-17. The Work of the Admiralty Ship Welding Committee. Amos L. Ayre and G. M. Boyd. *Welder,* v. 15, July-Sept. 1946, p. 56-61.

A few spectacular failures in welded ships, which led to the research work described, were characterized by the following main features: They consisted in sudden, extensive fractures accompanied by little or no deformation of the fractured edges; similar fractures had only very rarely occurred in riveted ships; fractures were seldom confined to the welds, but affected large areas of plating remote from welds; with few exceptions the fractures originated at some kind of notch effect, such as a square hatch corner, break of superstructure, or defective weld; there was a noticeable tendency for the fractures to occur in cold weather or in the refrigerated cargo spaces.

22-18. The All-Welded Tanker "Phoenix". William Arnold Stewart. *Welder,* v. 15, July-Sept. 1946, p. 62-68.

Development; characteristics; design; assemblies; welding; performance. Detailed drawings.

22-19. All-Welded Submarines Built at Chatham Dockyards. *Welder,* v. 15, July-Sept. 1946, p. 69-72, 74, 75.

History of the application and development of welding in submarine structure.

22-20. Molybdenum Steel Riveting. *Engineering,* v. 162, Dec. 13, 1946, p. 561.

Ingenious device used in the assembly of turbine blading which eliminates previous difficulties caused by short life of the tungsten-copper tips of the electrical riveting machines.

22-21. Taking Stock of Resistance Welding. Part I. John E. Ponkow. *Industry and Welding,* v. 19, Dec. 1946, p. 44-45, 78-80.

New techniques in the spot welding of aluminum and galvanized material.

22-22. Repair Maintenance in the Plant Weldery. *Industry and Welding,* v. 19, Dec. 1946, p. 48-49, 82, 86.

How oxy-acetylene and arc welding equipment help to keep things flowing continuously and efficiently at the Bernheim plant of Schenley Distillers Corp.

22-23. Resistance Welding Aids in the Production of Jet Engines. Frank G. Harkins. *Welding Journal,* v. 25, Dec. 1946, p. 1175-1178.

Setups used for welding of stainless elbow seams. Total fabrication time is 75 sec. as compared to 19.4 min using atomic-hydrogen hand welding, and warpage rejections have been eliminated.

22-24. Welding and Other Fabrication Methods for Hastelloy Alloys. C. G. Chisholm. *Welding Journal,* v. 25, Dec. 1946, p. 1179-1183.

Recommended methods. Results of tensile tests at elevated temperatures tabulated and micrographs of broken test pieces shown.

22-25. Flame Cutting Operating Data. A. F. Chouinard. *Welding Journal,* v. 25, Dec. 1946, p. 1186-1188.

Charts presented which enable one to estimate oxygen consumption and cutting speeds for various thicknesses of steel plate. The construction of the charts is explained, and how to lay out the maximum number of disks on a given plate.

22-26. Projection Welding of Fasteners. Robert A. Reich. *Welding Journal,* v. 25, Dec. 1946, p. 1189-1192.

A method of resistance welding in which current flow and heating during the welding operation are localized at predetermined points. Methods and design considerations. Diagrams and pictures.

22-27. Efficiency of War-Born Operating Methods Is Inspiration for Today's Welding Production. A. F. Davis. *Welding Journal,* v. 25, Dec. 1946, p. 1193-1194

How welded tank-tread units were fabricated by Cleveland Steel Erecting Co., Bedford, Ohio.

22-28. Expansion and Contraction. R. B. Aitchison. *Welding Journal,* v. 25, Dec. 1946, p. 1195-1202.

How the location and amount of expansion and contraction, buckling, warping, and other distortions which occur on heating a metal nonuniformly, as in welding, may be estimated. How this approximate information is applied to welding techniques.

22-29. Development of a Two-Row High-Strength Spot Welded Lap Joint in 24S-T Alclad Aluminum Alloy. L. M. Crawford and J. E. Pease. *Welding Journal,* v. 25, Dec. 1946, p. 1203-1210.

Development of above type of joint with over 50,000 psi. ultimate tensile strength, for each of several sheet thickness combinations in which all joints fractured by failure in the base metal along one row of welds.

22-30. Soft Soldering. Part II. *Metal Industry,* v. 69. Dec. 20, 1946, p. 508.

Investigation into the problems of solderability.

22-31. Arc Welding and Cutting Under Water. (Continued.) L. Mills. *Transactions of the Institute of Welding,* v. 9, Oct. 1946, p. 156-158, 167.

Results of tests made on three single V-butt welds produced under water. Tensile, bend and hardness tests were carried out on each weld. The bend test results were obtained by using apparatus as specified by the Admiralty, and the specimen bent with the wide face of the weld in tension. General principles of the equipment in oxy-hydrogen and oxy-carbon arc processes; choice of hydrogen as a preheating fuel; gas pressures; execution of an underwater cut.

22-32. Control of Distortion in Welded Ship Structures. George Johnson. *Transactions of the Institute of Welding,* v. 9, Oct. 1946, p. 159-167.

Factors influencing residual stress. and notes on stress relief, distortion in butt and fillet welds, minimum welding, welded shaft brackets and sternposts, buckling, dimensional accuracy, and welding sequence.

22-33. Welding Fixtures for Mass Production. A. E. Rylander. *Tool Engineer,* v. 17, Jan. 1947, p. 32-41.

Simple fixtures and straightline flow of materials result in ease of operation and a very high production potential. Station sequence and flow charts of various operations.

22-34. Pressure Welding Stainless Steel Rings. Charles J. Burch, Arnold L. Rustay, Alan Crowell, and Stephen M. Jablonski. *Steel,* v. 120, Jan. 13, 1947. p. 88-90. 92, 94-95. Also *Steel Processing,* v. 32, Dec. 1946, p. 782-787, 802-804, 812.

Progress report on the application of pressure welding to the production of stainless steel rings ranging in sizes up to 20 in. in diameter with cross sections from 1.5 to 4.5 sq.in. Close control of surface preparation, end pressure, and rate of heating are essential.

22-35. Decoding the Code Requirements for Welded Branches of Pressure Piping. A. B. Donkersley. *Power,* v. 91, Jan. 1947, p. 84-85.

Simple, dependable explanation.

22-36. How to Select Wear Resisting Alloys for Welding. Joseph A. Cunningham. *Machine Design,* v. 19, Jan. 1947, p. 139-142.

Ten factors to be considered when choosing hard surfacing electrodes or rods. Table presents basic information concerning a variety of hard facing alloys. How to minimize spalling.

22-37. 1 Braze + 120 Parts→1 Cylinder Block. John H. Giroux. *Welding Engineer,* v. 32, Jan. 1947, p. 40-42.

Design features of the engine for Crosley cars, plus operations and equipment involved in brazing the cylinder blocks.

22-38. Welding in Railroad Maintenance. Arthur Havens. *Welding Engineer,* v. 32, Jan. 1947, p. 43-46.

Engine trucks of faulty design successfully altered in a small locomotive repair shop. Problems of broken driving boxes solved by arc and gas welding.

22-39. Welded Gears Replace Castings. J. H. Crumley. *Welding Engineer,* v. 32, Jan. 1947, p. 47.

Welding procedure; how distortion is eliminated.

22-40. Chrysler's Cycleweld Process. Stanley H. Brams. *Welding Engineer,* v 32, Jan. 1947, p. 48-50.

How it differs from welding and forms a strong cemented bond. Some possible applications and design opportunities.

22-41. A Loom for Metal Fabric. *Welding Engineer,* v. 32, Jan. 1947, p. 53.

A 25-electrode multiple spot welder weaves wire mesh at production speeds.

22-42. Automatic Heaters Welded Automatically. M. G. Hawkins. *Welding Engineer,* v. 32, Jan. 1947, p. 58-60.

Various steps in manufacture of 40-gal. steel tank and its jacket.

22-43. Resistance Spot Welding Speeds Aircraft Fabrication. Part I. Frederick S. Dever. *Production Engineering & Management,* v. 19, Jan. 1947, p. 60-64.

Importance of design; spot groupings; material composition; facts for designer; replacing rivets; no sandblasting; assembly work.

22-44. Weld Done. *Industry and Welding,* v. 19, Jan. 1947, p. 30-33.

Story, in pictures, of welding operations at Ford Motor Co.

22-45. Production Welding the Postwar Washer. Fred Gandert. *Industry and Welding,* v. 19, Jan. 1947, p. 40-42.

Arc and resistance welding employed in construction of the Laundromat.

22-46. Flame Cutting Stainless Steel. *Industry and Welding,* v. 19, Jan. 1947, p. 54, 56.

Special fluxing process and a method of applying the flux in stainless steel cutting.

22-47. Electric-Arc-Oxygen Process Speeds Cutting of Alloy Steels. Vallory H. Laughner. *Machinery,* v. 53, Jan. 1947, p. 174-177.

A hollow electric rod and a stream of oxygen are combined in the "Oxyarc" cutting process to create temperatures that cut through alloy steels and nonferrous metals in but a fraction of the time formerly required. Thin sheet or plate up to 3 in. thick can be cut without distortion or contamination in one pass of the rod.

22-48. Arc Welding of High Speed Steel. D. D. Howat. *Welding,* v. 14, Dec. 1946, p. 544-556.

Report of successful methods adopted for the repair of broken high speed cutting tools. Technique evolved for welding the high speed steel to mild steel. Investigations were carried out to determine the properties of the welded specimens. Particular importance is attached to the correct heat treatment of the parts before and after welding.

22-49. Welding Stainless Steel Sheet. W. A. Woollcott and R. R. Sillifant. *Welding,* v. 14, Dec. 1946, p. 557-565.

Principles of the process, equipment required and its application to work on stainless steel sheet. Results of a metallurgical investigation of both manual and automatic welds.

22-50. Weed Cutting Launch Fabricated by Arc Welding. G. F. Fairman. *Welding,* v. 14, Dec. 1946, p. 567-569.

General description of the welding operations on this type of launch.

22-51. Oxygen Cutting. Part VI. E. Seymour Semper. *Welding,* v. 14, Dec. 1946, p. 570-574.

Latest type of equipment and technique with appropriate operating data. This section particularly deals with economic aspects.

22-52. Deep Fillet Gas Welding. *Iron Age,* v. 159, Jan. 23, 1947, p. 60-62.

Description of cost-saving process. (Translated from a discussion in *Autogene Metallbearbeitung.*)

22-53. A Few Observations on Solid Phase Bonding. George Durst. *Metal Progress,* v. 51, Jan. 1947, p. 97-101.

A general discussion of the theory of the joining of metals (similar and dissimilar) without use of welding, soldering, or brazing techniques. Brief references made to the literature and results of a few experiments included.

22-54. Heavy Cutting Applications in Foundry and Steel Mill. R. S. Babcock. *Welding Journal,* v. 26, Jan. 1947, p. 5-11.

Apparatus and techniques used for oxygen cutting of steel up to 66 in. thickness.

22-55. A New Stick Feeder Welding Apparatus. Joseph M. Tyrner. *Welding Journal,* v. 26, Jan. 1947, p. 13-16.

Tool consists of an inclined tube along which a carriage is propelled by a motor. The electrode is fastened to the carriage by means of an electrode holder. As the electrode burns down, the carriage moves along the tube with the proper speed to hold the desired arc length. Device is self-contained, portable, and easy to set up.

22-56. Resistance Welding of Spring Steel to Low-Carbon Steel. Arthur Willink. *Welding Journal,* v. 26, Jan. 1947, p. 30-31.

Technique was devised for production of snaps such as those used on harnesses. Explains how to prevent the quenching action of water-cooled electrodes in tight contact with the work due to pressure.

22-57. Penetration and Welding Speed in Contact Arc Welding. P. C. van der Willigen. *Philips Technical Review,* v. 8, Oct. 1946, p. 304-308.

Advantages in welding technique and economy obtainable with the new type of electrodes, which were described in a recent article by the author.

22-58. Furnace Brazing Steel Insecticide Bombs. Allen T. Cole and H. M. Webber. *Steel,* v. 120, Jan. 27, 1947, p. 70-73, 110, 113-114.

Plant in which entire layout for fabricating 10,000 containers per 8-hr. day is planned around two roller hearth copper brazing furnaces. Principle of straight-line flow is maintained by belt and roller conveyers through assembly, bonding, testing and inspecting processes.

22-59. Kitchen and Bathroom Units for Prefabricated Houses. *Machinery (London),* v. 69, Dec. 26, 1946, p. 811-817.

Complete kitchen unit, with heater to warm living room and hot water system, is backed by complete bathroom fixtures. Welding operations on the linen cupboard, and main assembly jig for the cupboard.

22-60. Fixtures Make Welders Flexible. Part III. Ed Reilly. *American Machinist,* v. 91, Jan. 30, 1947, p. 84-85.

Loading devices, rotating fixtures and gun welders, which, when combined, speed fabrication of many commercial units.

22-61. **Resistance Welders Mass-Produce Containers.** *American Machinist,* v. 91, Jan. 30, 1947, p. 104-105.
Pictures with brief descriptions show how complex 18-gage steel containers are made at a rate of 220 per hr., by forming and resistance welding rather than deep drawing.

22-62. **Recommended Spot Welding Procedures.** Frederick S. Dever. *Iron Age,* v. 159, Jan. 30, 1947, p. 46-50.
Suggestions for design. Preparation, equipment and inspection for spot welds in aircraft structures.

22-63. **Some Notes on Inert-Arc Welding.** R. F. Wyer. *Sheet Metal Worker,* v. 38, Jan. 1947, p. 137-138.
The process and its application to various metals.

22-64. **Welding Machine Maintenance at Ryan Aeronautical Company.** C. A. Lehton and H. F. Worcester. *Western Metals,* v. 5, Jan. 1947, p. 26-28.
Systematic methods for maintenance and lubrication. Maintenance costs have been reduced approximately one-third because repairs and adjustments become evident before they can take on large proportions. Greater utilization of plant machinery and more economical operation of production tools have been realized.

22-65. **New Oxygen-Arc Process for Cutting Ferrous and Nonferrous Alloys.** H. R Clauser. *Materials & Methods,* v. 25, Jan. 1947, p. 78-81.
The "Oxyarc" process, its applications and advantages. An arc is established between the work and a coated tubular rod, through which oxygen flows. The cutting is accomplished by the combination of melting from the high-temperature arc and the oxidation reaction.

22-66. **Spot Weld Quality on Low Carbon Steel.** J. J. Riley. *Steel Processing,* v. 33, Jan. 1947, p. 36-39.
Hundreds of welds were made using different combinations of weld time, electrode force, and welding current. Results were correlated to develop equations and tables for predicting weld quality (tensile shear strength) from the above factors, and others such as thickness of the work and size of the weld.

22-67. **Letter to the Editor.** J. F. Lincoln. *Steel Processing,* v. 33, Jan. 1947, p. 40-41.
President of Lincoln Electric Co. objects to emphasis placed on inspection of welds for porosity, undercutting, etc. He says that, regardless of such defects, the weld is usually stronger than the adjacent metal.

22-68. **Heat Distribution Around the Welding Arc.** N. N. Rykalin. *Engineers' Digest (American Edition),* v. 4, Jan. 1947, p. 16-18.
Deals with three ideal cases from a mathematical point of view. These are: a point source of heat traveling over a solid body; a linear source of heat traveling over a thin plate; and a laminar source of heat traveling along a rod of small cross section. Effect of arc movement is shown graphically. Theoretical calculations agree well with measurements. (Condensed from *Avtogennoe Delo,* no. 2, 1946, p. 6-11.)

22-69. **Welded Construction of a Drop-Shaped Container for Liquid Fuel.** *Engineers' Digest (American Edition),* v. 4. Jan. 1947, p. 44.
New design of 123,000-cu.ft. tank recently erected in France and method of erection. (Condensed from *Le Genie Civil,* v. 123, Nov. 1, 1946, p. 298.)

22-70. **Air Pressure Speeds Automatic Welding.** *Steel,* v. 120, Feb. 3, 1947, p. 97, 144, 146.
Application involves high air pressure up to 1000 psi. to control sequences in fast, automatic multispot resistance welding. A second development is a storage battery-powered machine that provides excessive power needed for flash welding aluminum.

22-71. **San Francisco's Own Resistance Welders.** Ralph G. Paul. *Western Machinery and Steel World,* v. 38, Jan. 1947, p 86-89, 110.
Theoretical considerations influencing design of equipment for resistance welding.

22-72. **Spot Welding Technique.** Frederick S. Dever. *Western Machinery and Steel World,* v. 38, Jan. 1947, p. 100-105.
Experiences at Ryan Aeronautical Corp. on design, selection of material, preparation of parts, and equipment.

22-73. **Economics of Arc Welding.** J. A. Dorrat. *Welding,* v. 15, Jan. 1947, p. 2-10
Factors which determine the economic application of welding. Material preparation, design, electrode size, welding current, duty cycle and joint accuracy from an essentially practical standpoint.

22-74. **Resistance Welding in Mass Production.** A. J. Hipperson and T. Watson. *Welding,* v. 15, Jan. 1947, p. 11-24.
Suitability of the different processes for various materials and types of joints.

22-75. **Maintenance of Arc Welding Plant.** E. W. Harding. *Welding,* v. 15, Jan. 1947, p. 25-28.
Practical information regarding the care of arc welding plant. Recommendations should help to save both time and money.

22-76. **Oxygen Cutting. Part VII.** E. Seymour Semper. *Welding,* v. 15, Jan. 1947, p. 29-33.

Latest type of equipment and technique; appropriate operating data.

22-77. **Method of Restoring the Wobblers of Cast Iron Rolls.** I. D. Kuzema, A. I. Serpokrylov, and V. S. Aristov. *Welding,* v. 15, Jan. 1947, p. 37.

Machinable gray cast iron was deposited using cast electrodes, the composition of which is given. Also describes mechanical setup. (Abstracted from *Avtogennoe Delo,* no. 10, 1945.)

22-78. **Gas Welding of Aluminized Steel.** G. N. Kulakova. *Welding,* v. 15, Jan. 1947, p. 37.

Composition of a flux which gave good results. (Abstracted from *Avtogennoe Delo,* no. 10, 1945.)

22-79. **Glass-to-Metal Joints.** J. H. Partridge. *Sheet Metal Industries,* v. 24, Jan. 1947, p. 119-128.

Techniques employed for glass-to-metal seals made by direct fusion. Some examples of the two classes of joints and data for the thermal expansion of the glass and metal and the maximum stress in typical joints.

22-80. **The Development and Improvement of Spot Welding Electrodes.** G. F. James. *Sheet Metal Industries,* v. 24, Jan. 1947, p. 159-166.

Application of copper alloys in the manufacture of electrode tips. Principal aim was to determine optimum welding conditions for several types of copper alloy electrodes. Effects of electrode tip diameter and life were studied and considerable work was done on the evaluation of the effects of hardness, annealing at various temperatures and resistance to wear.

22-81. **The Welding of Nonferrous Metals. (Continued.) Part VIII.** E. G. West. *Sheet Metal Industries,* v. 24, Jan. 1947, p. 167-172.

Welding of copper and its alloys. (To be continued.)

22-82. **The New Brown Boveri Automatic Arc Welding Head.** *Brown Boveri Review,* v. 33, April-May 1946, p. 107-111.

A machine for bare-wire electrode welding. Principle used not only insures exact control and simplicity of use but also reliable operation, attained by avoiding the use of auxiliary gear and mechanisms. Control is entirely automatic, the winding being completely enclosed.

22-83. **Heliarc Welding.** R. J. Anderson. *Canadian Metals & Metallurgical Industries,* v. 10, Jan. 1947, p. 14-21.

The welding torch; power requirements; typical applications. Tables give recommended welding current values.

22-84. **Weldability of Malleable Cast Iron.** T. J. Palmer. *Transactions of the Institute of Welding,* v. 9, Dec. 1946, p. 183-188.

Examines the various factors involved in order to explain why this material is not amenable to welding, particularly fusion welding.

22-85. **Welding Builds Stainless-Steel Kettles.** Clyde B. Clason. *Welding Engineer,* v. 32, Feb. 1947, p. 39-43, 72.

Equipment and procedures employed by Groen Mfg. Co.

22-86. **Hitting Trouble Before It's Due.** C. A. Lehton and H. F. Worcester. *Welding Engineer,* v. 32, Feb. 1947, p. 49-51.

How a planned preventive maintenance program has eliminated shutdowns and reduced by one-third the costs of keeping welding equipment in order.

22-87. **R-F Heating—and Why It Works.** B. E. Rector. *Welding Engineer,* v. 32, Feb. 1947, p. 52-54.

Nontechnical explanation of what radio-frequency heating is and how it is used for brazing and hardening.

22-88. **Welding in the Cement Industry.** Aubrey Smith and Walter J. Campbell. *Welding Engineer,* v. 32, Feb. 1947, p. 62-65.

Examples of application of welding as a means of building new equipment and keeping existing equipment in perfect operating condition.

22-89. **Powder Cutting and Scarfing.** D. H. Fleming. *Welding Engineer,* v. 32, Feb. 1947, p. 66-70, 113.

How use of a metallic powder provides a versatile process capable of handling a wide variety of alloy compositions from ingot form to finished product.

22-90. **All-Welded Sheaves.** T. W. Ling. *Welding Engineer,* v. 32, Feb. 1947, p. 72.

Three pieces of steel are welded together in the same manner as a fabricated wheel or gear from a hub, web and rim.

22-91. **Welding Sheet Metal for Enameling.** Orville F. Barnett. *Finish,* v. 4, Feb. 1947, p. 17-19, 56, 58.

Two separate approaches suggested for eliminating the spalling of enamels.

22-92. **Metal-to-Metal Adhesives.** Thomas D. Perry. *Plastics,* v. 6, Feb. 1947, p. 26, 28-29, 85-87.

Charts, tables, and description give properties of metal-to-metal joints made using "Redux", a phenol-formaldehyde adhesive.

22-93. **Repair Maintenance Fabrication in the Plant Weldery. Meat Packing Plant.** *Industry and Welding,* v. 20, Feb. 1947, p. 40-41, 83-86.

Equipment and operations in a meat packing plant.

22-94. Taking Stock of Resistance Welding. Part II. John E. Ponkow. *Industry and Welding*, v. 20, Feb. 1947, p. 44-45, 92-93.

New techniques in the spot welding of aluminum and galvanized material.

22-95. Automatic Welding Corrosion Resistant Metals. R. J. Anderson and H. J. Roberts. *Industry and Welding*, v. 20, Feb. 1947, p. 48-50, 52, 54.

New procedures for welding copper, nickel, monel, nickel-clad, the stainless alloys and 4 to 6% chromium steel.

22-96. Molybdenum Steel Riveting. *Iron Age*, v. 159, Feb. 13, 1947, p. 49.

Device has been used successfully in the assembly of turbine blading for the riveting of the blades to diaphragms. Employs tungsten-carbide tip shrouded in a molybdenum steel cup.

22-97. Handling Is the Answer in Welding Loco Boilers. *American Machinist*, v 91, Feb. 13, 1947, p. 106-107.

Procedures at American Locomotive Co. at Schenectady.

22-98. Magnetic Templet Tracing Increases Accuracy of Shape-Cutting. *Product Engineering*, v. 18, Feb. 1947, p. 92-96.

Single blowpipe accuracy of ± 0.010 in. and four-blowpipe accuracy to ± 0.0150 in. are claimed for the Oxweld Type CM-41 machine.

22-99. Welded Steel Tubing Improves Truck Body Construction. *Product Engineering*, v. 18, Feb. 1947, p. 99.

Standard sizes of square and rectangular steel tubing are welded to form custom truck bodies. Steel body is claimed to be 25 to 30% lighter and 50% stronger than the wooden type.

22-100. Assembly of Aluminum Parts by Furnace and Dip Brazing Methods. A. H. Peterson. *Product Engineering*, v. 18, Feb. 1947, p. 115-117.

Design details for aluminum parts to be joined by furnace or dip brazing methods. Use of jigs, self-positioning assemblies, tack welding and riveting to hold assemblies during brazing. Cleaning and corrosion protection of brazed assemblies.

22-101. Flux-Injection Cutting Stainless Steels. Part I. G. E. Bellew. *Steel*, v. 120, Feb. 17, 1947, p. 86-88, 115.

Injected directly into the cutting-oxygen stream, flux chemically removes obstructing oxides to expose fresh base metal to the cutting jet in this latest process of severing stainless. Fundamentals, capacities, and advantages of the methods. (To be continued.)

22-102. Dual Joining Method. *Steel*, v. 120, Feb. 17, 1947, p. 104-105.

Method employed by fabricator of steel igloos for Navy's reserve fleets. Fasteners and welding "team" to seal half spheres protecting guns against atmospheric attack.

22-103. Electric Arc Welding of Copper-Base Alloys. H. Hose. *Machinery*, v. 53, Feb. 1947, p. 178-181.

Recommended procedures for joining silicon bronze, beryllium copper, aluminum bronze, and brasses of various compositions.

22-104. Automatic Arc Welding Boosts Tank Production. *Production Engineering & Management*, v. 19, Feb. 1947, p. 78, 80.

Automatic welding, supplemented by clever jigs and fixtures, reduces actual welding time on tanks to one quarter of that required for manual welding.

22-105. Welding Fixtures for Mass Production. Part III. A. E. Rylander. *Tool Engineer*, v. 18, Feb. 1947, p. 27-30.

"Merry-go-round" consists of a ring running on a circular track. The work moves to the machine and away from it, on a single belt conveyer, with one operator loading and unloading. Eight welders, disposed in staggered position inside and outside the conveyer, produce at the rate of 240 completed assemblies per hour. Front cross bar of an automobile frame used as assembly example.

22-106. Induction Soldering Speeds Production. *Electronic Industries & Electronic Instrumentation*, v. 1, Jan. 1947, p. 3.

How technique is applied to production of stainless steel kitchen utensils at Adel Precision Products Corp., Huntington, W. Va.

22-107. New Development in Blind Riveting. *Western Metals*, v. 5, Feb. 1947, p 38-39.

New rivets utilize a new upsetting technique. Each rivet is an assembly of two parts—a special hollow body with a hole drilled through it, and a stem, assembled in the hole. The rivet is upset in the work by pulling the stem through the rivet with a pneumatic or manual gun. When the stem is pulled, it forces the shank of the rivet to expand and completely fill the hole in the work. Needs just one operator. Other production economies.

22-108. Welding of Manganese Castings in Special Trackwork, Collaborating With Committee 27—Maintenance-of-Way Work Equipment. *American Railway Engineering Association Bulletin*, v. 48, Feb. 1947, p. 586-589.

Results of investigation.

22-109. Flux-Injection Cutting Stainless Steels. G. E. Bellew. *Steel*, v. 120, Feb. 24, 1947, p. 80-82, 104.

The carbide precipitation phenomenon and its behavior. Precautions in cutting shapes, risers and heavy steel mill material.

22-110. Pressure Welding. E. R. Proctor. *Aircraft Production*, v. 9, Feb. 1947, p. 63-66.

Commercial process adapted to the production of aircraft undercarriage legs utilizing a specific pressure and heating the work until upsetting occurs. Degree of shortening is taken as the control factor. Structure of material remains unaltered between the seam and the parent metal.

22-111. **Powder Cutting of High Alloys.** D. H. Fleming, Jr. *Materials & Methods*, v. 25, Feb. 1947, p. 73-76.

Iron-rich powder is introduced into the oxygen stream of the cutting torch to make the flame pass through the refractory oxides in the alloys. Use of the process on stainless steel, cast iron, high-alloy steels, and certain nonferrous materials, and other applications.

22-112. **Weldments.** Edwin Laird Cady. *Materials & Methods*, v. 25, Feb. 1947, p. 101-116.

Welding terms; engineering suitability; planning and designing weldments; production factors and materials for weldments; and typical applications of weldments.

22-113. **Weldability of Magnesium-Base Alloys.** *Materials & Methods*, v. 25, Feb. p. 101-116.

Relative weldability of various alloys.

22-114. **The Welding of High-Temperature, High-Pressure Steel Valves.** Vincent T. Malcolm and Sidney Low. *Welding Journal*, v. 26, Feb. 1947, p. 101-110.

Research and experience at Chapman Valve Manufacturing Co. in designing and constructing a welded bonnet valve for high pressures and temperatures.

22-115. **S-Curves Point the Way for Successful Welding of Any High-Carbon or Alloy Steel.** Leo Berner. *Welding Journal*, v. 26, Feb. 1947, p. 110-113.

The use of S-curves in welding to avoid hardness by proper heat control of the part to be welded, thus reducing or eliminating the likelihood of weld-cracking. (Reprint from *Victor Weld.*)

22-116. **Adams Lecture for 1946—New Frontiers in Welding.** Wendell F. Hess. *Welding Journal*, v. 26, Feb. 1947, p. 114-120.

Arc weld cooling rates; cracking and residual stresses; aluminum and magnesium alloy spot welding; hardenable steels; spot welding of heavy gages of steel; arc welding of thin sheets and hardenable steels; new equipment and research trends. 25 ref.

22-117. **Pressure-Welding Stainless Steel Rings.** Arnold L. Rustay, Alan Crowell, Stephen M. Jablonski and Charles J. Burch. *Welding Journal*, v. 26, Feb. 1947, p. 129-137.

A progress report on the application of pressure welding to the production of stainless steel rings ranging in sizes up to 20 in. in diameter with cross sections ranging from 1½ to 4½ sq. in. The process proved successful, but careful evaluation is necessary to determine the most economical method for a specific job.

22-118. **Resistance Welding for Porcelain-Enameled Ware.** Ralph S. Florek. *Welding Journal*, v. 26, Feb. 1947, p. 137-140.

Factors involved are illustrated by several specific cases, for instance, spout attachment on tea kettle. Estimates of cost savings.

22-119. **Flash Welding of Concentrated Areas up to 24 Sq.In. in S.A.E.1020, N.E.9440 and N.E.8620 Steels.** D. Bruce Johnston. *Welding Journal*, v. 26, Feb. 1947, p. 65s-81s.

Details of an extensive investigation which resulted in basic data for design of a machine capable of flash welding 8-in. solid rounds, and an area of 76 sq. in. of more-distributed area. Tables, charts, photomicrographs.

22-120. **Progress Report on the Flash Welding of High-Strength Aluminum Alloys.** R. Della-Vedowa and E. A. Reynolds. *Welding Journal*, v. 26, Feb. 1947, p. 81s-87s.

Techniques developed for flash welding of 24S-T aluminum alloy tubing and bar stock. Joint efficiencies and joint strength consistencies were determined by static tension tests of welded specimens. Tests were also conducted to determine corrosion susceptibility of the weld area when unprotected and under a protective coating.

22-121. **Discussion on "The Effect of Alloying Elements on the Tensile Properties of 25-20 Weld Metal".** G. E. Linnert and F. K. Bloom. *Welding Journal*, v. 26, Feb. 1947, p. 119s-120s.

Results presented in paper by Campbell and Thomas, Nov. 1946 issue, compared with results of a similar program carried out by the authors. In most cases, the agreement is very good.

22-122. **Discussion of Paper "Additional Timing Period of New Motor-Driven Control Increases Gun Welder Speed".** A. C. Johnson. *Welding Journal*, v. 26, Feb. 1947, p. 103s.

Although the control described in paper by H. I. Stanback, November 1946 issue, will operate at a rate of 400 cycles per min., nevertheless, this rate of speed results in poor and inconsistent welds.

22-123. **Mechanical Properties and Microstructure of Open-Butt Oxy-Acetylene Compression Welds.** H. H. Chiswik. *Welding Journal*, v. 26, Feb. 1947, p. 115s-119s.

Essential features of the open-butt oxy-acetylene compression welding process. The members to be welded

are heated to the melting point using a multiflame oxy-acetylene burner inserted between the surfaces to be joined. When the faces reach the melting point, the burner is withdrawn and pressure is applied to make the joint. Mechanical properties and microstructural characteristics of welds made by the process.

22-124. **How to Clean Welds.** Thomas L. Adas. *Iron Age,* v. 159, Feb. 27, 1947, p. 44-46.

The effects of various kinds of foreign matter upon the quality of a welded joint, how the cleaning should be performed, and what tools should be employed.

22-125. **Practical Applications of Blind Riveting.** Milo Ketchum. *Iron Age,* v. 159, Feb. 27, 1947, p. 60-62.

A number of unusual uses for blind rivets, such as repairing loose roofing sheets, attaching door hinges to stainless steel refrigeration units and installing metal insulation retainer sheets in inaccessible locations.

22-126. **Mechanical Properties of Flush-Riveted Joints Submitted by Five Airplane Manufacturers. Progress Summary No. I.** William Charles Brueggeman. *National Advisory Committee for Aeronautics, Wartime Report W-79,* Feb. 1947, 7 p.

Charts, tables, and photomicrographs.

22-127. **Soft Soldering as a Production Process.** R. G. Harper. *Sheet Metal Industries,* v. 24, Feb. 1947, p. 345-354.

Soldering of components fabricated from sheet and strip, from the point of view of the efficient quantity-production of joints of consistently high quality with economy in labor and solder. Aspects of the soldering operation which directly influence the selection of solder. (Paper presented to the Sheet and Strip Metal Users' Technical Association, at the Winter Conference in London on Jan. 31, 1947.)

22-128. **Methods of Studying the Behavior of Steel During Welding.** H. Granjon. *Sheet Metal Industries,* v. 24, Feb. 1947, p. 385-391.

Experimental methods on plates 10 mm. thick.

22-129. **Riveting and Spot Welding Magnesium Alloys.** Allen G. Gray. *Steel,* v. 120, March 3, 1947, p. 114-115, 142, 144, 146, 148, 150, 152, 154.

Effective fastening procedures involving use of modern equipment and understanding of a few fundamental principles.

22-130. **Induction Soldering Speeds Kitchen Utensil Production.** L. Gise and J. R. Stewart. *Steel Processing,* v. 33, Feb. 1947, p. 101-102.

Application of induction soldering of stainless steel kitchen utensils resulted in an increased production rate, in a reduction of labor cost, and in an improvement of the quality of the product.

22-131. **Cast Iron Weld Repair Methods.** W. J. Pfander. *American Foundryman,* v. 11, Feb. 1947, p. 24-34.

Methods employed at Ford Motor for making weld repairs, and some of the problems encountered.

22-132. **Metallic Joining of Light Alloys.** *Light Metals,* v. 10, Jan. 1947, p. 20-32; Feb. 1947, p. 103-108.

The available methods of joining thin-gage light-alloy materials and the metallurgical aspects of the problem of soft soldering. The many and varied soft solders which have been suggested for aluminum. The lack of coordinated investigation and field test results is stressed. (To be continued.)

22-133. **Submerged Melt Welding of Corrosion Resistant Metals.** R. J. Anderson and H. J. Roberts. *Canadian Metals & Metallurgical Industries,* v. 10, Feb. 1947, p. 18-19, 29, 34.

Methods that have been developed in producing satisfactory welds in this class of materials. Welding of some heat resistant metals by the submerged melt welding process.

22-134. **Characteristics of Welding Arcs on Aluminum in Atmospheres of Helium and Argon. (Concluded.)** F. A. Wassell. *Aluminium and the Non-Ferrous Review,* v. 11, Oct-Dec. 1946, p. 88.

The most important features of these welding processes. The conclusions are based in experiments reported in the previous installment.

22-135. **Joining Magnesium Alloys.** Allen G. Gray. *Steel,* v. 120, March 10, 1947, p. 90-91, 114, 116, 119.

Gas, arc, and flash welding and soldering techniques. (To be continued.)

22-136. **Crankshaft Repair and Assembly.** S. Hunter Gordon. *Welding,* v. 15, Feb. 1947, p. 50-53.

An application for flash butt welding; details regarding assembly methods. (Extract from a paper for the Institute of Marine Engineers.)

22-137. **Resistance Welding in Mass Production.** A. J. Hipperson and T. Watson. *Welding,* v. 15, Feb. 1947, p. 61-69.

First principles and the effects of spot welding variables upon operation.

22-138. **Welded Steel-Plate Axlebox.** *Welding,* v. 15, Feb. 1947, p. 53.

Axlebox, fabricated from steel plates, which takes the R.C.H. standard bearing, liner and lubricating pad, is of simple all-welded construction and economical both in manufacture and maintenance. Lends itself to the use of simple jigs and flow production.

22-139. Oxygen Cutting. Part VIII. Manual and Machine Methods. E. Seymour Semper. *Welding,* v. 15, Feb. 1947, p. 73-78.

Electronically controlled cutting machines.

22-140. Weld Defects. Their Causes and Prevention. Frederick S. Dever. *Welding,* v. 15, Feb. 1947, p. 79-84.

Various defects likely to be encountered in arc, gas, spot, and atomic-hydrogen welding.

22-141. Welded Locomotive Boilers Are Here to Stay. *Welding Engineer,* v. 32, March 1947, p. 35-38.

Methods of fabrication, joint preparation, testing.

22-142. Nash Builds All-Welded Bodies. John H. Giroux. *Welding Engineer,* v. 32, March 1947, p. 39-41, 64.

Spot and arc welding operations.

22-143. The Hydrogen-Fluorine Torch. H. F. Priest and A. V. Grosse. *Welding Engineer,* v. 32, March 1947, p. 42-43.

Results obtained with the torch to date. Economic and transportation problems.

22-144. Welding Processes at Northrop Aircraft. Fred M. Burt. *Welding Engineer,* v. 32, March 1947, p. 44-49.

Inert-gas shielded-arc welding, flash-welding, and spot welding procedures.

22-145. Flame Cutting Plates for Welded Ships. Milton Forman. *Welding Engineer,* v. 32, March 1947, p. 53-56.

System developed at Ingalls Shipbuilding Corp. for plate edge preparation. Joint-type chart covers every condition found in the construction of decks, shells, and bulkheads for ships.

22-146. Welding Military Equipment in Britain. E. Dacre Lacy. *Welding Engineer,* v. 32, March 1947, p. 57-59.

A review covering fabrication of guns, carriages, the Bailey bridge, landing craft.

22-147. Industrial Motor Line Fabricated by Welding. Quentin Graham. *Welding Engineer,* v. 32, March 1947, p. 60-61.

Welding and flame cutting simplify production of Elliott "Fabri-Steel" electric motor line.

22-148. Uniform Welding Results. Malcolm Thomson. *Steel,* v. 120, March 17, 1947, p. 101-102.

Equalization in multiple spot welding and heating is achieved quite simply by separating secondary circuits, having one transformer wound with individual secondary coils, one for each welding circuit.

22-149. Clear the Track for Welding. Part I. H. S. Swan. *Industry and Welding,* v. 21, March 1947, p. 26-27, 54-56.

Welding is used as a primary method of manufacture on the smallest to the largest locomotives at American Locomotive plant, Schenectady, N. Y.

22-150. Why Not More Structural Welding? *Industry and Welding,* v. 21 March 1947, p. 29-31, 85.

Purpose, preconstruction provisions, permissible unit stresses and welding procedures of structural welding code.

22-151. Welding Sheet Metal to Tubing. Paul Newton *Industry and Welding,* v. 21, March 1947, p. 32-33, 58.

Use of stampings and tubing plus a combination of resistance and arc welding.

22-152. How to Weld Stainless Steel With the Inert Arc. John B. Solter. *Industry and Welding,* v. 21, March 1947, p 40-42.

How to weld stainless steel, emphasizing preparation of the work and technique.

22-153. Repair, Maintenance and Fabrication in the Plant Weldery—Sherwin Williams Company. *Industry and Welding,* v. 21, March 1947, p. 44-45, 80-83.

Various oxy-acetylene and arc-welding operations at Sherwin Williams Co.

22-154. Note on the Soldering of Beryllium. Borge Madsen. *Review of Scientific Instruments,* v. 18, Feb. 1947, p. 135.

A technique claimed to give superior results.

22-155. Automatic Resistance Welders Speed Railroad Car Construction. Arthur M. Unger. *Iron Age,* v. 159, March 20, 1947, p 40-45.

Production of lightweight all-steel Pullman cars by the use of giant, highly automatic resistance welding machines. Units are capable of welding an entire car roof or two complete car sides at one time. One unit is capable of making more than 8000 spot welds in slightly more than 2 hr. to complete an entire car roof in one operation. Ingenious fixtures and photo-tube relay indexing systems used in these operations.

22-156. Uniform Values Increase Dependability of Resistance Welds. Part II. Frederick S. Dever. *Production Engineering & Management,* v. 19, March 1947, p. 59-62.

Inspection methods, weld specifications, and a description of equipment.

22-157. Hydrogen-Fluorine Torch. Homer F. Priest and Aristid V. Grosse. *Industrial and Engineering Chemistry,* v. 39, March 1947, p. 431-433.

A welding or cutting torch which

uses a mixture of hydrogen and fluorine, and produces extremely high flame temperatures. Copper, nickel, monel, and steel were welded readily, but attempts to weld aluminum were unsuccessful. Copper was cut evenly, upon increasing the fluorine supply.

22-158. Oxy-Acetylene Pressure Welding as It Affects Design. R. A. Kubli. *Product Engineering,* v. 18, March 1947, p. 117-121.

Metals that can be pressure welded; details of joint construction and other design information; pressure, heat input and shortening, which are taken as the independent variables of the welding process. Time and temperature are treated as dependent variables.

22-159. Projection Welding of Low Carbon and Stainless Steel Sheet. Mario L. Ochieano. *Product Engineering,* v. 18, March 1947, p. 124-126.

Proper application of projection welding techniques. Details of projection locations and recommended sizes for different thicknesses of low carbon and stainless steel sheet. Allowable design strengths for projection welds.

22-160. Chemical Composition of Austenitic Welding Electrodes. Richard K. Lee. *Metal Progress,* v. 51, March 1947, p. 445-447.

Study of 171 heats of 18-8 electrode wire showed that to avoid root cracks in weld metal the chromium must be at least twice the nickel, and the carbon and the phosphorus both at practicable minimums. Nitrogen induces crack sensitivity in weld metal from higher alloy (25% Ni, 12% Cr).

22-161. City Gas and Oxygen Mixture Effective in Flame Cutting Steel. *Steel,* v. 120, March 24, 1947, p. 77.

Steel plates from thinner gages up to 12 in. in thickness are cut to pattern in varying quantities. The clean, square edges resulting are said to be relatively free from kerf marks and oxidized material, thus requiring little or no machining. Illustrations show the start of a cut in 2¼-in. thick 15-20 steel with a 530-B.t.u. manufactured gas-oxygen mixture and No. 2 Harris-Calorific burner tip; the cut over halfway across the slab after 2 min., and the severed face of a slab.

22-162. Powder Cutting and Scarfing of Oxidation Resistant Materials. D. H. Fleming, Jr. *Welding Journal,* v. 26, March 1947, p. 201-208.

Techniques and applications of these methods to stainless steels.

22-163. Development and Applications of Lime-Ferritic Electrodes. D. L. Mathias and A. P. Bunk. *Welding Journal,* v. 26, March 1947, p. 209-217.

The properties and the chemistry and metallurgy of organic and mineral electrodes. Results of tests comparing the low-temperature impact properties of welds using E-6020 and lime ferritic electrodes.

22-164. Spot Welding Under Water. Charles L. Coomer. *Welding Journal,* v. 26, March 1947, p. 217-218.

Techniques developed by American Air Filter Co. for spot welding of the impeller blades of the turbine-like apparatus manufactured by the company.

22-165. Building Code Requirements for Welding Structural Steel. Simon A. Greenberg. *Welding Journal,* v. 26, March 1947, p. 219-222.

A survey of codes in 205 cities having a population of 50,000 or more.

22-166. Choice of Cable and Transformer Size for Portable Spot Welders. Myron Zucker. *Welding Journal,* v. 26, March 1947, p. 233-238; discussion, p. 238-239.

Tables and charts which make it easy for the man on the job to determine which water-cooled cable should be used for a given job.

22-167. Cold Cracking in the Heat-Affected Zone. C. B. Voldrich. *Welding Journal,* v. 26, March 1947, p. 153s-169s.

The nature of the above phenomenon in metal-arc welds in steels, and the influence of steel properties and hydrogen from welding electrodes on the incidence of cold cracking. Data on the hydrogen-generating characteristics of various types of electrodes and on the influence on cracking of chemical composition and the distribution of carbon and alloying elements in steel. Application of this knowledge and techniques for comparing crack sensitivity of steels. 28 ref.

22-168. Discussion of Paper, "The Control of Weld Hot Cracking in Nickel-Chromium-Iron Alloys." R. David Thomas, Jr. *Welding Journal,* v. 26, March 1947, p. 190s-191s.

In discussion of paper by Kihlgren and Lacy in the Nov. 1946 issue, it is suggested that a tabulation of complete weld metal analyses would be useful. Also suggests going slow in introducing 5% or more Cb to high nickel-chromium weld metals other than 80% Ni, 14% Cr.

22-169. Case Histories Show Versatility of Resistance Welding. Joseph W. Kehoe. *Materials & Methods,* v. 25, March 1947, p. 77-81.

Examples of the intelligent application of resistance welding to achieve better products and reduced production costs.

22-170. "Press Welding" Aluminum for Aircraft Radiators. T. G. Haertel. *Materials & Methods,* v. 25, March 1947, p. 127.

Condensed account of method of welding and forming aluminum sheet used by the Germans during the war in the manufacture of aircraft radiators. Sheets of aluminum are virtually melted together between gas heated dies that are closed under pressure. When the dies are nearly closed, compressed air is injected between the sheets to blow open the areas between the rows of welds, in order to form passageways conforming to the design of the dies. (Condensed from Report No. 417 of Joint Intelligence Objectives Agency, 12 p.)

22-171. Metallic Joining of Light Alloys. Part III. *Light Metals,* v. 10, March 1947, p. 111-120.

Fluxes for soldering of aluminum, theory and practice of hard solders, and soldering for light alloys; the mechanical and corrosion properties of soldered joints.

22-172. Snow Flakes and Hairline Cracks in Weld Metal. M. Lefevre. *Engineers' Digest (American Edition),* v. 4, March 1947, p. 131-135.

Conditions conducive to appearance of these defects in steels and weld metals; the influence of various factors such as hydrogen content, cooling rate, quenching temperature, tensile stresses, and chemical composition. Countermeasures. 14 ref. (Condensed from *Revue de la Soudure,* v. 1, no. 2, 1945, p. 39-49; *Arcos,* v. 23, July 1946, p. 2411-2429.)

22-173. The Arc Welding of Steel Aircraft Components. R. Smallman-Tew. *Welder,* v. 15, Oct-Dec. 1946, p. 79-80.

A successful changeover from gas welding to arc welding. "Oxford" undercarriage end fitting consists of three tubes of T45 material, 17 gage by approximately 1½ in. diameter, the short horizontal tube being offset 5° from the axis of the other two tubes.

22-174. Recent Examples of Welded Ship Structures. J. M. Stevenson. *Welder,* v. 15, Oct-Dec. 1946, p. 81-87.

The constructional details of one unit of a completely welded double bottom, part of a fully welded deck, an ordinary transverse watertight bulkhead, and a design for a large stern-frame.

22-175. A Satisfactory Technique for Vertical and Horizontal-Vertical Butt Welds in Plate Work. E. Fuchs. *Welder,* v. 15, Oct-Dec. 1946, p. 88-91.

A 90° double-V preparation is recommended as leading to high-quality, high-speed butt welds in the vertical and horizontal-vertical positions. For the latter the only special precaution required is to use a deep-penetrating electrode for the first run on the second side. For vertical seams a back-step method and two-operator working have solved the problem of overlap and virtually that of lack of centerline fusion.

22-176. All-Welded Gas Holder. *Welder,* v. 15, Oct-Dec. 1946, p. 98-103.

Construction, assembly and positioning, erection and final welding.

22-177. Pulling Harrow Teeth With a Spot Welder. *Steel,* v. 120, March 1947, p. 82-83.

Job done by resistance welding simply by having a high-amperage current flow through the bar and by pulling it apart at the proper moment so that it will stretch and break into two perfect points. Welder was equipped with two special hydraulic clamping devices, cylinders and flexible cables, and instead of using the cylinders for obtaining pressure at the tips, the operation was reversed.

22-178. Oxy-Acetylene Cutting in Sheet Metal Work. Part I. R. F. Helmkamp. *Sheet Metal Worker,* v. 38, March 1947, p. 46-49.

Fundamentals of the process and equipment used.

22-179. Production Applications for Inert Gas-Shielded Arc Welding. H. T. Herbst. *Light Metal Age,* v. 5, March 1947, p. 14-17, 21.

Applications of Heliarc welding for the light metals.

22-180. Hot Punching Railroad Tie Plates. *Fusion Facts,* v. 12, Feb. 1947, p. 5-6.

Use of hard facing alloys on the punches. Instead of becoming too dull for further use after 200 to 500 plates, the punches produced 27,500 plates without shutdown when faced with "Stoody 6" alloy.

22-181. A Novel Method of Rebuilding and Hard Facing Dredging Equipment. *Fusion Facts,* v. 12, Feb. 1947, p. 7-10.

Improved hard facing technique using "Stoody Self-Hardening" and "Stoody High Carbon" alloys to build up the leading edges of the impeller and "Stoody Tube Borium" for the core edges.

22-182. A Simple Jig for Hard Facing Shovel Track Pads. *Fusion Facts,* v. 12, Feb. 1947, p. 14-15.

Jig is described and illustrated.

22-183. Variations in Hard Facing Tire Chains. *Fusion Facts,* v. 12, Feb. 1947, p. 16-18.

How to use hard facing to increase life of tire chains by 3 to 7 times.

22-184. Trends in Automobile Assembly and Welding. Louis M. Benkert. *Steel Processing,* v. 33, March 1947, p. 162-163, 178.

Some general remarks on present-day assembly methods.

22-185. Submerged-Melt Welding in Pressure Vessel Fabrication. N. G. Schreiner. *Steel Processing,* v. 33, March 1947, p. 169-174, 180.

Advantages of process; principles of the process; preparation for welding; fabricating methods.

22-186. How Silver Brazing May Simplify Casting Design. S. D. Heron. *Steel,* v. 120, April 7, 1947, p. 90-91, 120, 122.

Experimental work on multipiece silver-brazed L-head cylinder blocks and other complicated castings indicates that an assembly can be as economical and efficient as one-piece casting.

22-187. This Company Fabricates and Enamels Washing-Machine Tubs. Dana Chase. *Finish,* v. 4, April 1947, p. 15-18, 56, 58.

Tub fabrication by welding and porcelain enameling in a box furnace plant.

22-188. Modern Electric Welding Equipment for the Cement Industry. Aubrey Smith and Walter J. Campbell. *Pit and Quarry,* v. 39, March 1947, p. 82-84, 86.

Applications to contruction and maintenance of equipment.

22-189. Hard Facing Welding in Concrete Products Plant Equipment Maintenance. Ralph Reiner and C. E. Ehle. *Pit and Quarry,* v. 39, March 1947, p. 152-154.

Techniques used.

22-190. Jigging for Better Welds. *Linde Tips,* v. 26, April 1947, p. 37-45.

Simple work-holding devices which make the job easier.

22-191. Fast Tooling for Tank Heads. *Linde Tips,* v. 26, April 1947, p. 46-47.

Forming press platen and die ring shaped by portable cutting machine equipped with a C-39 cutting blowpipe in only 12¾ hr., including layout and setup time. Fabricating costs, less stock and final machining, amounted to less than $70.00.

22-192. Reclamation Improves Performance. *Linde Tips,* v. 26, April 1947, p. 48-49.

An example whereby printing press clips rebuilt by bronze welding and bronze surfacing are better than new.

22-193. Work Supports for Machine-Cutting. *Linde Tips,* v. 26, April 1947, p. 53-54.

Design and dimensions of work supports for oxy-acetylene shape-cutting. They can be fabricated readily from standard steel shapes.

22-194. Oxy-Acetylene Pressure Welding. *Linde Tips,* v. 26, April 1947, p. 56.

How the process works and its advantages. Mechanical equipment required.

22-195. Handle Oxygen Cylinders With Care. *Linde Tips,* v. 26, April 1947, p. 58-60.

A few rules to eliminate carelessness and improper handling.

22-196. For Easier Control of Weld Metal. *Linde Tips,* v. 26, April 1947, p. 62-64.

Some uses in repair shop for welding carbon products.

22-197. Welding and Health. T. B. Jefferson. *Welding Engineer,* v. 32, April 1947, p. 47-51.

Are welders and flame-cutting operators subjected to unusual health hazards? Most of the dangers are imaginary, as shown by investigators who have made careful studies of the medical records of thousands of industrial plants during the war. In every instance records reveal that the general health of a welder was no worse than that of other workers.

22-198. Who Makes It? The Welding Engineer's 1947 Directory. *Welding Engineer,* v. 32, April 1947, p. 61-84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116.

Manufacturers and selected distributors of welding equipment and supplies are listed alphabetically under 325 classifications.

22-199. Some Fundamental Principles for the Resistance Welding of Sheet Metal. H. E. Dixon. *Sheet Metal Industries,* v. 24, March 1947, p. 607-612.

The various factors affecting pressure welding and some fundamental aspects of resistance welding.

22-200. The Welding of Nonferrous Metals. Part VIII. (Continued.) E. G. West. *Sheet Metal Industries,* v. 24, March 1947, p. 618-622, 624.

The welding of copper and its alloys. (To be continued.)

22-201. Welded Carriage Construction. *Welding,* v. 15, March 1947, p. 98-107.

The procedures adopted for the production of welded mainline coaches. Their design provides a striking example of how the application of welding can reduce weight and at the same time increase strength.

22-202. Resistance Welding in Mass Production. A. J. Hipperson and T. Watson. *Welding,* v. 15, March 1947, p. 117-124.

The application of the various resistance processes from the point of view of the production engineer. Various types of spot welding equipment, the services required, and maintenance.

22-203. Strength and Safety of Welded Joints. M. Ros. *Welding,* v. 15, March 1947, p. 125-131.

Based on results and conclusions from 12-yr. tests in Switzerland. (Abstracted from *Schweizer Archiv,* no. 1, 2, 3, 1946.)

22-204. Arc Welding Electrode Holder. *Engineering,* v. 163, March 14, 1947, p. 201.

British-made electrode holder is completely insulated and wholly enclosed.

22-205. Certain Aspects of Seam Welds in Aluminum Alloy Sheets. Gerard H. Boss. *Metal Progress,* v. 51, April 1947, p. 599-602.

Essential difference between seam welds and spot welds is that the overlapping spots comprising the seam short-circuit a considerable part of the welding current, thus postheating the slugs. This extra heat has definite metallurgical action in relieving internal stress and even permitting the diffusion of elements segregated during the welding cycle proper. Radiographs of welded aluminum alloy sheet; use of radiography and tensile testing in determining the quality of seam-welded joints.

22-206. Riveting Disadvantages Overcome by Machines. William P. Brotherton. *Production Engineering & Management,* v. 19, April 1947, p. 56-60.

Various types of rivets and some examples of machine riveting.

22-207. Spot Welding of Assemblies. Floyd Matthews. *Aero Digest,* v. 54, April 1947, p. 82.

Procedures at Boeing Aircraft.

22-208. Position Control in Welding. Arthur M. Unger. *Electronic Industries & Electronic Instrumentation,* v. 1, April 1947, p. 3.

Multiple-electrode welder with an electronically controlled indexing mechanism for welding stiffeners to sheet steel for box-car sides. Welding takes place whenever a beam of light passes through a hole and strikes a phototube.

22-209. High Lights and Side Lights. *General Electric Review,* v. 50, April 1947, p. 56-57.

How automatic arc welding is used to build up worn locomotive-wheel centers.

22-210. Foundry and Steel Mill Oxy-Acetylene Cutting. R. S. Babcock. *Industry and Welding,* v. 20, April 1947, p. 26-29, 64-65.

Development of improved equipment for cutting normal thicknesses of steel and design of machine-borne cutting apparatus for severing thicker sections than have ever been cut before.

22-211. Are You Fabricating Correctly? G. E. Campbell. *Industry and Welding,* v 20, April 1947, p. 30-32, 65-66.

The important subjects of electrode selection, design of fixtures, welding positioners, equipment and personnel.

22-212. What Is Proper Welding Control? Part I. G. W. Garman. *Industry and Welding,* v. 20, April 1947, p. 34-36.

Why resistance welding control is needed and how proper control equipment fills this need. Requirements for each type of resistance welding. (To be continued.)

22-213. Why, When, Where, How to Use the Carbon Arc With A. C. Transformers. William P. Good. *Industry and Welding,* v. 20, April 1947, p. 40-42, 44, 68-70, 72.

Four basic elements or conditions to properly evaluate this method of applying heat are: amount of metal to be heated and degree of heat required; type of joint to be made; kind of metal involved; and suitability of the Arc Torch method.

22-214. Depositing Overlaid Surfaces by the Submerged-Melt Welding Process. L. C. Bradburn, J. M. Keir and J. E. Taylerson. *Welding Journal,* v. 26, April 1947, p. 297-300.

Techniques for Unionmelt surfacing in the manufacturing of articles composed of dissimilar materials. For example, cast-steel valves can be surfaced with stainless materials which exhibit better wear and corrosion qualities than those normally obtained from cast steel.

22-215. Oxygen Cutting of Steel at Elevated Temperatures. J. F. Kiernan and J. S. Sohn. *Welding Journal,* v. 26, April 1947, p. 301-313.

Results of over 3000 controlled-cutting tests at rolling mill temperatures (1700 to 2000° F.) are correlated and presented in order to supply information not previously published concerning fundamental standards and relationships.

22-216. Ryan Welding Innovations. William P. Brotherton. *Welding Journal,* v. 26, April 1947, p. 323-326.

New techniques developed at Ryan Aeronautical Co. for welding of stainless. These include: a new type of oxy-acetylene welding torch with two tips, for simultaneous trimming of flange metal and seam welding in production of exhaust systems; a three-tip torch with two natural gas tips for preheating and postheating of stainless steel welds and an oxy-acetylene tip for welding; tacking pliers and adjustable clamp for spot welding; device for automatic atomic-hydrogen welding of tubular stainless-steel sections; and several other useful production devices.

22-217. Jigs and Fixtures for Automatic Fusion Welding. E. D. Morris and L. J. Berkeley. *Welding Journal,* v. 26, April 1947, p. 332-337.

Illustrated article describes a variety of these arrangements.

22-218. Submerged Melt Welding of Corrosion Resistant Metals. R. J. Anderson and H. J. Roberts. *Welding Journal,* v. 26, April 1947, p. 338-342.

Some of the problems and reports on some of the methods that have been developed for producing satisfactory welds in this class of material. The welding of some heat resistant metals.

22-219. An Investigation of the Influence of Hydrogen on the Ductility of Arc Welds in Mild Steel. Alan E. Flanigan. *Welding Journal,* v. 26, April 1947, p. 193s-214s.

An effort was made to correlate the ductility of E6010 mild steel welds with hydrogen content of weld metal. Ductility was evaluated by means of a notched-bend test at −40° F. Hydrogen analyses were made by a vacuum-extraction method. Specimens were subjected to a variety of treatments including postheating, preheating, and rapid cooling following welding. Low-hydrogen welds were prepared with lime-base coated electrodes and by the submerged-arc process for comparison purposes. To obtain further information, hydrogen-free welds were charged with hydrogen by means of acid pickling. An extensive study of postheating at temperatures from 250 to 1150° F. was made to determine its effects on weld hardness and residual stress, and upon hydrogen content and ductility. 50 ref.

22-220. Fatigue Tests on Some Spot Welded Joints in Aluminum Alloy Sheet Materials. H. J. Grover and L. R. Jackson. *Welding Journal,* v. 26, April 1947, p. 215s-232s.

The major results of an extensive fatigue-testing program conducted at Battelle Memorial Institute under the sponsorship of N.A.C.A. Three simple structural elements were tested: spot welded stiffened panels, sheets with spot welded attachments, and spot welded lap joints. Among the variables examined were: sheet thickness, spot weld spacing, and, to a lesser extent, sheet material and welding procedure. Contains a large number of tables, charts, photographs, and photomicrographs. 10 ref.

22-221. Summary of Results of Tests Made by Aluminum Research Laboratories of Spot Welded Joints and Structural Elements. E. C. Hartmann and G. W. Stickley. *Welding Journal,* v. 26, April 1947, p. 233s-251s.

Available information concerning spot welding as a means of joining aluminum alloy parts and comparisons of the relative merits of spot welded and riveted aluminum alloy structural elements. (Reprinted from Technical Note No. 869, National Advisory Committee for Aeronautics, Washington, Nov. 1942.)

22-222. New Flux-Cored Filler Rods for Torch Welding. F. Danhier. *Welding Journal,* v. 26, April 1947, p. 252s-253s.

Several new rods and the method for their fabrication. Why rods with the flux distributed throughout the interior of the rod are superior to coated rods. (Abstracted from *Arcos,* no. 102, 1946, p. 2430-2433.)

22-223. A Welding Quest. William L. Warner. *Welding Journal,* v. 26, April 1947, p. 253s-256s.

Developing a suitable simple test method for the evaluation of quantitative weldability of base metal. The various methods which have been proposed and used are considered critically, and their limitations pointed out. Concludes that any method for determining the welding characteristics of metals, particularly high-strength steels, should include both a crack-susceptibility test and a welded-joint toughness test. Possible value of obtaining a correlation between ductility and toughness at various strength levels.

22-224. Radial Head Positioner Speeds Welding Operations. *Iron Age,* v. 159, April 10, 1947, p. 84.

New type of fixture is composed of an automatic shielded-arc welding head, traveling on a beam that encompasses a vertical zone of 8 ft., with the assembly rotating around a fixed axis to a maximum radius of 20 ft. It is designed to augment the efficiency of automatic arc welding and speed up the process.

22-225. Causes and Prevention of Welding Defects. Frederick S. Dever. *Iron Age,* v. 159, April 17, 1947, p. 50-53.

The most frequently occurring defects and the causes and methods of eliminating them.

22-226. Mechanized Soft Soldering. *Steel,* v. 120, April 14, 1947, p. 98, 123.

Production of air-conditioning units speeded by moving work at predetermined speed under fluxing brush, oxy-acetylene flame and a solder feed.

22-227. Some Fundamental Principles for the Resistance Welding of Sheet Metal. (Continued.) H. E. Dixon. *Sheet Metal Industries,* v. 24, April 1947, p. 813-820.

Material characteristics; resistance welding of low carbon steels; a.c. spot welding of thin sheets; condenser discharge spot welding of thin low-carbon sheet; and spot welding of thick low-carbon steel sheets. (To be continued.)

22-228. **Industrial Practice for Spot Welding Light Alloys.** *Sheet Metal Industries,* v. 24, April 1947, p. 824-828, 830.
Paper prepared by the L.R. 4 Committee on spot welding procedure for light alloys as a basis for revision of B.W.R.A. Memorandum T.8. Machines and settings; machine maintenance; surface preparation; pickling solutions for aluminum; measurement of contact resistance; electrodes; method of assembly; inspection and control; solutions and pastes for surface preparation.

22-229. **Inert-Gas Shielded-Arc Welding for Difficult-to-Weld Materials.** H. R. Clauser. *Materials & Methods,* v. 25, April 1947, p. 86-90.
Variety of materials that can be welded; process characteristics; costs; design considerations; welding procedure and technique.

22-230. **Metallic Joining of Light Alloys. (Continued.)** *Light Metals,* v. 10, April 1947, p. 203-209.
American investigations on soft-soldering practices for aluminum. The possibilities of supersonic vibration as an aid to "tinning".

22-231. **Automatic Welding in Steel Plant Maintenance.** H. E. Holman. *Iron and Steel Engineer,* v. 24, April 1947, p. 89-93; discussion, p. 93-94.
Use in reclaiming rotating parts.

22-232. **Oxy-Acetylene Cutting in Sheet Metal Work. Part II.** R. F. Helmkamp. *Sheet Metal Worker,* v. 38, April 1947, p. 57-60, 102-103.
Possibilities and limitations of the process in the shop.

22-233. **Tough Alloys Cut Like Cheese.** Fred P. Peters. *Scientific American,* v. 176, April 1947, p. 149-152.
Processes developed by Linde Air Products, Air Reduction, and Arcos Corp.

22-234. **"Musts" in Silver Brazing Stainless.** A. W. Swift. *Steel,* v. 120, April 28, 1947, p. 98-99, 132.
Fittings and connections are easily brazed on stainless steel if controls are exercised in cleaning joint area, fluxing, heating, and tinning. Main difficulty lies in handling chromium oxide which forms rapidly on surface of steel. Analyzes and disposes of problems encountered on several specific production jobs.

22-235. **Salvaging Iron Castings With Machinable Arc Welds.** David W. DeArmand and Samuel Epstein. *Foundry,* v. 75, May 1947, p. 146, 148, 254.
Technique using Ni-Rod, a development of International Nickel Co.

22-236. **Effects of Flux in Welding Stainless Steel.** G. Richardson. *Iron Age,* v. 159, May 1, 1947, p. 42-46.
Effect of various types of fluxes on welds made in stainless steel by the atomic-hydrogen process, with flux used in the underside. Causes of these cracks and the detrimental effect of fluxes rich in borates on welding operations in stainless.

22-237. **Portable Inert-Gas Metal-Arc Welder.** *Iron Age,* v. 159, May 1, 1947, p. 46.
Portable welding unit was specifically built for welding aluminum electrical conductors during construction and assembly operations, but is readily adaptable to other applications. Unit includes the welding transformer, cylinders of argon gas, and connections for the water and drain lines. Electrical control provides protection of the torch against failure of water supply and also starts and stops the argon gas flow and power to the torch.

22-238. **Joining Complicated Assemblies in One Operation.** *Steel,* v. 120, May 5, 1947, p. 112, 114.
Special multiple spot welding unit welds and "resistance rivets" 26 studs and clips to a stamped steel frame in less than 20 sec., assembling record changers in "record" time.

22-239. **Atomic Hydrogen Welding of Stainless Sheet.** George Richardson. *Iron Age,* v. 159, May 8, 1947, p. 72-74.
Welding technique and some of the simple but ingenious fixtures used.

22-240. **Carbon Soldering Fixtures Cut Rejects, Costs, Labor, Dermatitis.** Francis C. Dupre. *American Machinist,* v. 91, May 8, 1947, p. 101-103.
A few examples of their application and results.

22-241. **Costing of Arc Welding.** R. G. Braithwaite. *Transactions of the Institute of Welding,* v. 10, Feb. 1947, p. 10-12, 18.
The geometry of a weld, the electrode, influence of weld length, influence of electrode size on welding time, electricity consumption, and the use of these factors in quality control.

22-242. **Welding of Locomotive Boilers.** G. W. McArd. *Welding,* v. 15, April 1947, p. 146-154.
A survey of the general position of the application of welding to locomotive boiler construction. Suggestions as to further developments. Design and technique.

22-243. **Oxygen Cutting. Part IX.** E. Seymour Semper. *Welding,* v. 15, April 1947, p. 156-163.
Latest type of portable cutting machines; operating technique data.

22-244. **Resistance Welding in Mass Production. Part IV.** A. J. Hipperson and T. Watson. *Welding,* v. 15, April 1947, p. 164-177.
Electrode types, electrode holders, water cooling, and the arrangement of special electrodes for difficult assemblies.

22-245. **Electronic Control Methods in Welding Applications.** *Electronic Industries & Electronic Instrumentation,* v. 1, May 1947, p. 2-3.
Various electronic methods.

22-246. **"Two-Tone" Process Explained.** W. C. McLott. *Welding Engineer,* v. 32, May 1947, p. 36-40.
Arc process may be used to weld, rebuild or hard face heavy sections of machine parts of a wide variety of purposes. Method uses filler rods in conjunction with an electric arc instead of with the oxy-acetylene torch. The higher, more-concentrated heat of the electric arc melts down and deposits proportionally greater amounts of metal in a given time on worn surfaces.

22-247. **Spot Welding Structural Steel.** *Welding Engineer,* v. 32, May 1947, p. 53-56.
How resistance welding is being used to replace rivets in steel structures, and how problems of source of electrical energy were solved. Six-part cycle of cleaning or pickling by which the usual rust and scale present on hot-rolled structural steels may be eliminated. Summarizes advantage of three-phase equipment over single-phase.

22-248. **Torch Brazing Aluminum. Part I.** Harry A. Huff. *Welding Engineer,* v. 32, May 1947, p. 57-61.
The advantages of the process, types of aluminum alloys, joint strengths and corrosion resistance, design problems, jigs, fixtures, and positioners.

22-249. **Welding British Submarines.** E. Dacre Lacy. *Welding Engineer,* v. 32, May 1947, p. 62-64, 66.
History of the application; arrangement of sections to be welded; slipway layout; prefabricated sections; radiographic inspection of welds; repair work.

22-250. **Short Cuts and Kinks.** *Welding Engineer,* v. 32, May 1947, p. 70.
Conveyer for atomic-hydrogen welding. Shortening eyebars. Pipe-cutting attachment.

22-251. **Weld Repairing Defective and Damaged Castings.** *Steel,* v. 120, May 12, 1947, p. 118.
Mogul Arc Bonder, a low-voltage high-amperage unit utilizing compressed air, makes it possible to repair cracked motor blocks, fill blowholes in castings as well as to add metal to aluminum patterns, building up press fits for loose bearings and races and many other operations.

22-252. **Factors Influencing the Selection of Coating Ingredients for A.W.S. Type E6020 Electrodes.** Boyd E. Cass. *Foote Prints,* v. 18, no. 2, 1947, p. 13-19.
Experimental work conducted to determine the effect on electrode performance of variations in chemical composition and particle size of the coating materials.

22-253. **What Is Proper Resistance Welding Control? Part II.** G. W. Garman. *Industry and Welding,* v. 20, May 1947, p. 36-37, 39, 64-65.
Why control is needed and how proper control equipment fills this need. Requirements for each type of resistance welding.

22-254. **Clear the Track for Welding. Part II.** H. S. Swan. *Industry and Welding,* v. 20, May 1947, p. 40-41, 44, 46, 48.
Welding as applied to diesel engines and diesel locomotives. Welding organization and flow diagrams; flame cutting and hardening.

22-255. **Some Observations on Chipping and Scarfing Operations. Part II.** Ralph D. Hindson. *Blast Furnace and Steel Plant,* v. 35, May 1947, p. 553-557.
In technique known as hand scarfing, operator, wielding an oxy-gas torch, burns surface defects off steel plate. Considerable skill is required. Relative merits of chipping and of hand scarfing. Applicability of hot deseamers, which skin all four sides of the bloom or billet during rolling, and of mechanical chipping.

22-256. **Worn Mill Rolls Rebuilt by Welding 6½ Tons on Work Face.** *Iron Age,* v. 159, May 22, 1947, p. 80.
How approximately 6½ tons of alloy steel was deposited on the working face of a scrap-backup roll from a continuous hot strip mill at Jones & Laughlin's Pittsburgh works.

22-257. **Welding Power Piping With Chromium-Molybdenum Electrodes.** Orville T. Barnett. *Steel,* v. 120, May 26, 1947, p. 88-90, 125, 128, 130.
Specifications and techniques for the use of four basic electrode types in analyses ranging from 0.5 to 3.0% Cr and 0.5 to 1.0% Mo which are now being used for the welding of high-pressure, high-temperature piping.

22-258. **Pressure Welding of Light Alloys Without Fusion.** R. F. Tylecote. *British Welding Research Association,* Jan. 1946, 16 p.
Attempts to weld overlapping sheets of nine aluminum and three magnesium alloys by simultaneous application of heat and pressure at temperatures below their melting points. An aluminum alloy containing magnesium and silicon in the proportions of Mg_2Si, a duralumin type alloy, and an aluminum alloy containing 1¼% manganese, gave the best results. Effective cleaning of the surfaces was very important.

22-259. **The Cause of the Rubber-Brass Bond.** C. M. Blow. *India-Rubber Journal,* v. 62, April 26, 1947, p. 3-4, 6-7.

Experimental evidence to support the theory that the bonding of rubber to brass is primarily due to the catalytic action of the copper in producing oxidation or other products of the rubber which show specific adhesion to metal.

22-260. Progress Report on Preliminary Investigation of Metal-Bonded Ceramics. A. R. Blackburn and T. S. Shevlin. *Headquarters Air Materiel Command Technical Report No. 21,* May 1947, 32 p.

Equipment and techniques used in work being done at Ohio State University. Preliminary data on two combinations of silicon carbide and metal, and on 12 combinations of alumina and metal.

22-261. Proper Handling of Gas Welding Equipment. C. C. Hermann. *Power Plant Engineering,* v. 51, May 1947, p. 86-87.

Cleaning of torch tips; proper method of adjustment of connection nuts on welding torches; correct way to adjust gas-oxygen mixture.

22-262. Spot Welding of Primary Structures. *Steel,* v. 120, May 19, 1947, p. 88, 128.

Process as developed at Boeing Aircraft.

22-263. Stainless Steel Cutting. Howard G. Hughey. *Welding Journal,* v. 26, May 1947, p. 393-399.

The development of methods for the above. The technique of various methods and each evaluated. Recommends the "flux-injection" method for both mechanical and hand cutting.

22-264. Submerged Melt Welding in Pressure Vessel Fabrication. N. G. Schreiner. *Welding Journal,* v. 26, May 1947, p. 400-407.

Joint preparation and fabrication techniques for different joint designs for pressure vessels using the Unionmelt process.

22-265. Production Applications for Inert-Gas Shielded-Arc Welding. H. T. Herbst. *Welding Journal,* v. 26, May 1947, p. 410-418.

Principles and applications of heliarc welding.

22-266. Automatic Oxy-Acetylene Operations. R. F. Helmkamp. *Welding Journal,* v. 26, May 1947, p. 419-425.

Ways in which oxygen cutting can be used to speed up or improve miscellaneous metal-industry operations, other than the usual plate cutting.

22-267. Three-Phase Balanced-Load Resistance Welding Machines. J. L. Solomon. *Welding Journal,* v. 26, May 1947, p. 426-431.

Electrical circuits and controls and advantages over single-phase equipment.

22-268. Some Tests of Large Welded Structures. E. Paul DeGarmo. *Welding Journal,* v. 26, May 1947, p. 257s-267s.

Details of an extensive investigation of full-scale welded structures conducted for the U. S. Navy to aid in welded-ship design. Effects of weld preheating and postheating and of several different electrodes, as well as different designs.

22-269. Optimum Welding Conditions and General Characteristics of Spot Welds in Magnesium Alloy Sheet. W. F. Hess, T. B. Cameron, D. J. Ashcraft, and F. J. Winsor. *Welding Journal,* v. 26, May 1947, p. 268s-282s.

Test and examination methods. Optimum conditions were determined for each of the commercially available compositions of Mg alloy sheet in selected tempers and gages after chemical surface preparation. Physical properties of the welds for each material under optimum conditions, and the effects of different welding conditions. 18 ref.

22-270. The Inert-Gas Shielded-Arc Welding Process. Glenn J. Gibson. *Welding Journal,* v. 26, May 1947, p. 282s-294s.

An investigation of the use of the process for welding of stainless steel and other metals. Specific objectives were to determine the design basis for the necessary apparatus, to determine fundamental welding characteristics and limits of application, particularly for stainless steel, and to compare helium and argon as shielding gases. Coverage is limited to direct-current straight-polarity welding.

22-271. Residual Stresses in Welded Structures. Wilbur M. Wilson and Chao-Chien Hao. *Welding Journal,* v. 26, May 1947, p. 295s-320s.

An analysis was developed for determining the residual stresses produced when two plates are joined by a longitudinal weld, and two series of tests were made to verify this analysis. For both series, residual stresses were determined experimentally by the method of relaxation.

22-272. Metallic Joining of Light Alloys. *Light Metals,* v. 10, May 1947, p. 214-223.

Application of electrical fusion to the joining of aluminum wire and strip; survey of the patent literature on some typical apparatus. (To be continued.)

22-273. The Gluing of Light Metals. *Light Metals,* v. 10, May 1947, p. 234-241.

Numerous applications of metal-to-metal and nonmetal joints using synthetic resin adhesives, especially in aircraft construction.

22-274. How Atomic-Hydrogen Arc Welding Aids Production. R. F. Wyer. *Steel Processing,* v. 33, May 1947, p. 287-289, 307.

Factors which contribute toward speed when atomic-hydrogen arc welding is utilized. Instances where this type of welding is especially effective. Special features of joints to be welded by atomic-hydrogen arc. Method of welding and equipment.

22-275. "Fastener Engineering" in Product Assembly. *Steel Processing*, v. 33, May 1947, p. 290-293.

The development of miscellaneous fastening devices for thin-gage sheet metal. Holes are formed in such ways that the screws used are held in place without nuts.

22-276. An Aluminum Solder That Requires No Flux. *Materials & Methods*, v. 25, May 1947, p. 81-82.

Some of its uses. Test results covering melting properties, soldering operation, shear tests, electrical resistance, effect of vibration, and a preliminary investigation of corrosion. All tests were conducted on joints between two pieces of 3S½H aluminum alloy, and between this metal and one-half hard muntz metal (60% copper, 40% zinc).

22-277. Spot Welding in Aircraft Manufacture. Frederick S. Dever. *Materials & Methods*, v. 25, May 1947, p. 92-96.

Design of parts to be welded; materials to be spot welded and their preparation for spot welding.

22-278. Precision Energy-Storage Spot Welder. Rufus Briggs and Hans Klemperer. *Electronics*, v. 20, June 1947, p. 102-104.

Technical details of a compact capacitor-type spot welder for light-gage sheet metal and wire. A tube-controlled 200-microfarad storage bank provides a maximum storage-energy level of 225 watt-seconds. Tubes also terminate the discharge and block line power.

22-279. Welding Magnesium Alloys. *Aluminium & the Non-Ferrous Review*, v. 12, Jan-March 1947, p. 12-13.

Techniques, cleaning, filler rods, preheating.

22-280. Determination of the Permissible Oxygen Excess in the Oxy-Acetylene Flame. F. Bohler. *Engineers' Digest (American Edition)*, v. 4, May 1947, p. 224.

The equilibrium of the parts of the flame and the weld metal; the graphical determination of the mixing ratio for neutral flames; the decomposition pressures of metal oxides; and the use of a graph of both the partial oxygen pressure of the flame and decomposition pressure of the metal oxides plotted against the reciprocal of the absolute temperature. (Translated and abstracted from *Zeitschrift für Schweisstechnik*, v. 36, Aug. and Sept. 1946, p. 169-175, 191-195.)

22-281. The Performance Ratio of the Blowpipe Flame With Leftward and Rightward Welding. F. Bohler. *Engineers' Digest (American Edition)*, v. 4, May 1947, p. 239-241.

Forward technique is called leftward and backward is called rightward in this article. Rightward welding has been shown to be superior by practical welding tests. This conclusion is confirmed by a theoretical analysis. (Translated and condensed from *Zeitschrift für Schweisstechnik*, v. 36, Dec. 1946, p. 246-253.)

22-282. The "Cookson" Lock Joint. W. Cookson. *Sheet Metal Industries*, v. 24, May 1947, p. 985-988, 998.

A new type of joint for sheet metal assembly. This lock joint is a complete departure from conventional assembly methods, in that its components are made integral with the sheets to be joined, using a simple adaptation of an ordinary folding machine.

22-283. The Welding of Nonferrous Metals. Part VIII. The Welding of Copper and Its Alloys. (Continued.) E G. West. *Sheet Metal Industries*, v. 24, May 1947, p. 1017-1023, 1027.

Welding of copper-zinc-alloy and arc and resistance welding of brasses. Properties of brass welds.

22-284. Spot Welding of Light Alloys. Present Trends in American Machine Design. T. M. Roberts. *Sheet Metal Industries*, v. 24, May 1947, p. 1028-1032, 1034.

The roller spot welding machine. Storage battery spot welding machine. Sciaky three-phase to single-phase conversion system. (Papers presented at British Welding Research Assoc. Symposium.)

22-285. Refrigerator Assembly. *Welding*, v 15, May 1947, p. 195-203.

The use of various welding processes at new refrigerator factory in England.

22-286. Jointing of Brass. Edwin Davis. *Welding*, v. 15, May 1947, p. 204-213.

A survey of methods and applications.

22-287. Resistance Welding in Mass Production. A. J. Hipperson and T. Watson. *Welding*, v. 15, May 1947, p. 214-223.

The arrangement of different types of jigs and fixtures for spot welding including those for multi-spot work.

22-288. Oxygen Cutting. E. Seymour Semper. *Welding*, v. 15, May 1947, p. 224-226.

Special machine installations.

22-289. Bench-Welded Watch Springs. Clyde B. Clason. *Welding Engineer*, v. 32, June 1947, p. 40-42.

Use of spot welding in assembly of Elgin's "Elgiloy" mainsprings. Spot-

welded joints were found to be twice as strong as riveted ones.

22-290. **Torch Brazing Aluminum. Part II.** Harry Huff. *Welding Engineer*, v. 32, June 1947, p. 45-47.

The four major steps in the torch brazing of aluminum; production methods, and a list of products which may be fabricated by this method.

22-291. **Bending and Welding Pipe Coils.** M. G. Hawkins. *Welding Engineer*, v. 32, June 1947, p. 48-49.

Methods and equipment used by Olympic Pipe Fabricating Co., Seattle, which makes a specialty of prefabricated marine piping installations.

22-292. **New Design for A.C. Welders.** Arthur Simon. *Welding Engineer*, v. 32, June 1947, p. 50-52.

A novel a.c. welding transformer devised by a Swiss inventor. One of its advantages is that the arc is established promptly at points of zero current.

22-293. **Portable Trailer for Inert-Gas Shielded-Arc Welding.** *Welding Engineer*, v. 32, June 1947, p. 54.

Outfit built by engineers of the Aluminum Co. of America's welding section for the purpose of welding together aluminum electrical conductors during the construction of new plants.

22-294. **Trade Names of Resistance Welding Electrode Alloys and Resistance Welder Manufacturers' Assoc. Specifications.** *Welding Engineer*, v. 32, June 1947, p. 69.

In tabular form.

22-295. **Welding. Its Implications and Applications.** Paul Weidlinger. *Progressive Architecture*, v. 28, June 1947, p. 79-83.

Advantages and limitations of welding in the joining of structural steel for buildings. (To be concluded.)

22-296. **Preventive Measures Reduce Welder Upkeep.** C. A. Lehton and H. F. Worcester. *American Machinist*, v. 91, June 5, 1947, p. 118-119.

Maintenance procedures at Ryan Aeronautical Co.

22-297. **The New Bridge Over the Seine at Saint-Cloud.** *Welder*, v. 16, Jan-March 1947, p. 8-13.

Design principles, welding sequences and calculations, properties of steel used, girder fabrication, and erection procedures for new all-welded bridge. (Translated and condensed from *L'Ossature Metallique*, July-Aug. 1945.)

22-298. **Fabrication of All-Welded Landing Craft.** *Welder*, v. 16, Jan-March 1947, p. 14-18.

Illustrated by many photographs.

22-299. **The Fabrication of Framed Structures in High-Tensile Structural Steel by Welding.** R. Digby Smith. *Welder*, v. 16, Jan-March 1947, p. 18-23.

Requirements and difficulties encountered in the construction of military bridges which distinguish them from other bridges. Special requirements are portability, simplicity of assembly, and considerable elasticity in regard to loads, spans, and supports.

22-300. **Automatic Metallic-Arc Welding Hot Water Tanks.** *Steel*, v. 120, June 9, 1947, p. 94, 98.

Methods used at the Detroit plant of Ferro Stamping & Manufacturing Co.

22-301. **Automatic Welding of Steel Hinges.** *Machinery*, v. 70, May 15, 1947, p 515-516.

Use of Lincolnweld automatic metallic-arc equipment for welding door hinges.

22-302. **Welded Ship Fractures.** E. C. Kreutzberg. *Steel*, v. 120, June 16, 1947, p 120, 122.

Investigation Board report indicates that the fractures in welded ships were caused by notches built into the vessels, either through design or as the result of workmanship practices, and by steel which was notch sensitive at operating temperatures.

22-303. **Flash Welding Tubular and Solid Parts for Lockheed Planes.** Fred C. Pipher. *Machinery*, v. 53, June 1947, p. 160-163.

Technique used in permanently joining alloy steel members by welds that must be 95% as strong as the parent metal.

22-304. **Electronically Controlled Tracing Head.** *Product Engineering*, v. 18, June 1947, p. 102-103.

Details of system used to control automatic oxy-acetylene cutting torches. The control head follows an outline drawing on paper.

22-305. **Examples of Various Welding Designs and Techniques.** *Product Engineering*, v. 18, June 1947, p. 130-131.

Various ways to conserve weld material and to strengthen welded joints. Schematic diagrams depict many applications of welding techniques.

22-306. **Fine Silver Welded Tubing.** J. G. Henderson. *Product Engineering*, v. 18, June 1947, p. 160.

How to use atomic-hydrogen, carbon-arc or oxy-acetylene processes in welding silver tubing.

22-307. **Jigs and Fixtures for Resistance Welding.** C. A. Burton. *Machinery (London)*, v. 70, May 22, 1947, p. 533-540.

Their design and application. Jig and fixture materials; magnetic location of component parts; sequence of loading, welding and unloading; jig and fixture clamping methods; fixtures for use with portable gun welders.

22-308. Magnesium. Welding Fire Prevention. *Machine and Tool Blue Book,* v. 43, June 1947, p. 233-234, 236, 238, 240, 242, 244, 246, 248-250, 252, 254.

Gas, arc and spot welding procedures.

22-309. Welding of Alloy Steel Piping. Eric R. Seabloom. *Industry and Power,* v. 52, June 1947, p. 84-88.

Characteristics of alloys and how to choose rods, preheat temperatures, and heat treatments to produce weldments that meet exacting service requirements.

22-310. Long Rails for Transfer-Table Pit Fabricated at Night. *Railway Engineering and Maintenance,* v. 43, June 1947, p. 577-578, 588.

Pressure welding and installation of six 1160-ft. lengths for use at the Missouri Pacific's shops in Sedalia, Mo.

22-311. Are You Interested in Getting Better Welding at Lower Cost? Lew Gilbert. *Industry and Welding,* v. 20, June 1947, p. 26-29, 60, 62.

Factors which determine the quality and cost of welding.

22-312. Check Your Machine Flame Cutting Procedures. Ross Yarrow. *Industry and Welding,* v. 20, June 1947, p. 40-42, 44.

Procedures used by Republic Welding & Flame Cutting Co., Cleveland.

22-313. Series Capacitors for Improving Voltage Regulation on Circuits Supplying Power to Resistance-Welder Loads. W. C. Bloomquist and R. C. Wilson. *General Electric Review,* v. 50, June 1947, p. 21-23.

The voltage regulation problem in resistance welding. Series-connected capacitors with supply line, load-center units, step-down transformers. Protective equipment.

22-314. Electric-Furnace Brazing. Allen T. Cole and H. M. Webber. *General Electric Review,* v. 50, June 1947, p. 25-31.

Use of the above for manufacture of insecticide bombs. Making and testing the joints; operation of roller-hearth furnaces and plant layout.

22-315. Solid Phase Pressure Welding Offers Production Cost Savings. *Production Engineering & Management,* v. 19, June 1947, p. 75-76.

Linde process offers potential saving in the production welding of tube ends and similar parts by mechanization. Welding time is dependent on material thickness and seam length.

22-316. Improved Welding Techniques Spark Success of Steel Plate Fabricator. *Steel Processing,* v. 33, June 1947, p. 358-359.

Methods used at Black, Sivalls & Bryson, Inc., Oklahoma City, Okla.

22-317. Underflux Welding of Mine-Locomotive Wheels. C. D. Ramsden. *Coal Technology,* v. 1, Nov. 1946, T.P. 2111, 11 p.

Procedures adopted by Pittsburgh Coal Co. Cost analysis.

22-318. Metal Joining and Induction Heat Treating in Technical Metal Processing, Inc., Plant. *Industrial Heating,* v. 14, June 1947, p. 1006, 1008, 1010, 1012, 1046, 1048.

Miscellaneous operations.

22-319. New Upsetting Technique in Blind Riveting. *Steel,* v. 120, June 23, 1947, p. 118, 142.

Latest development utilizing specially designed two-part monel rivet for blind riveting.

22-320. Resistance Welding Improves Appearance of Sheet Metal Signs. *Steel,* v. 120, June 23, 1947, p. 122.

Rocker-arm welder is used in most instances on the different metals from which these signs are made.

22-321. Classification of Arc Welding Electrodes. *Transactions of the Institute of Welding,* v. 10, April 1947, p. 45-50, 59.

Report from a joint committee set up by the Institute of Welding and the Arc Welding Electrodes Section Technical Committee of the British Electrical and Allied Manufacturers' Assoc.

22-322. Future Ships. Will They Be All-Welded? *Transactions of the Institute of Welding,* v. 10, April 1947, p. 51-59.

A discussion by a panel of experts.

22-323. Notes on Welding Applied to Ship Construction. R. J. W. Rudkin. *Transactions of the Institute of Welding,* v. 10, April 1947, p. 60-66.

Economic considerations; combination of welding and riveting; radiography; development of welding technique; fabricated subassemblies; automatic welding.

22-324. Some Problems in the Approach to Welding Design. R. G. Braithwaite. *Transactions of the Institute of Welding,* v. 10, April 1947, p. 67-71.

The design of efficient welded structures demands a more detailed study of the physical and metallurgical properties of metal than is required in riveted structures. The use of high-tensile steel in bridge construction and stress distribution in welds and the factors involved in rigid joints.

22-325. The Relationship Between Welding Conditions and the Strength and Quality of Single Spot Welds in Deep Drawing Quality Mild Steel Sheet in Thicknesses From 20 to 14 S.W.G. A. J. Hipperson. *Transactions of the Institute of Welding (BWRA Supplement),* v. 10, April 1947, p. 3-10.

Results of an extensive experimental investigation are tabulated and charted.

22-326. An Apparatus for the Butt Welding of Fine Wires. L. D. Armstrong and T. M. Dauphinee. *Canadian Journal of Research,* v. 25, Section F, May 1947, p. 221-225.

Apparatus using a condenser discharge is suitable for most types of fine wires. Welding characteristics and possible applications.

22-327. Shop Testing to Determine Standard Procedure for Welding Rail Joints. Richard D. Snouffer. *Mechanization,* v. 11, May 1947, p. 86, 88, 123.

Procedures and equipment used by Pittsburgh Coal Co., at Library, Pa.

22-328. Metallized Glass for Low Cost Joining of Glass to Metal. Harold G. Vogt. *Materials & Methods,* v. 25, June 1947, p. 81-83.

Glass-metal bonding methods; characteristics of metallized glass; soldering techniques; design factors; applications.

22-329. Continuous Soldering of Small Motor Rotors Using High-Frequency Heat. W. L. Tesch and Paul A. Greenmeyer. *Materials & Methods,* v. 25, June 1947, p. 94-96.

High production and accurate control are achieved in the soldering of tiny motor rotors through the use of high-frequency heat and automatic feeding.

22-330. Hard Facing Materials. H. R. Clauser. *Materials & Methods,* v. 25, June 1947, p. 103-118.

The basic types of hard facing materials and their selection. Complete table of hard facing electrodes—a reference list of electrode types, trade names, compositions, and characteristics. Refers only to the hard surfacing done by welding.

22-331. Metallic Joining of Light Alloys. (Continued.) *Light Metals,* v. 10, June 1947, p. 273-275.

The difficulties of fluxless flame welding and the special problems to be encountered with aluminum. The process is described with reference to copper. (To be continued.)

22-332. Some Fundamental Principles for the Resistance Welding of Sheet Metal. (Continued.) H. E. Dixon. *Sheet Metal Industries,* v. 24, June 1947, p 1221-1226, 1230.

Spot welding, flash welding and seam welding of low-carbon steel; resistance welding of medium carbon and low-alloy steels; and resistance welding of austenitic stainless steels and of aluminum-base alloys. (To be concluded.)

22-333. The British Welding Research Association Symposium on the Welding of Light Alloys: Methods of Surface Preparation of Light Alloys for Spot Welding. F. C. Dowding. *Sheet Metal Industries,* v. 24, June 1947, p. 1232-1236, 1238.

Contact-resistance measurements; surface preparation of duralumin and of aluminum-magnesium alloys; the effect of scratch brushing and surface roughness; preparation of magnesium-base alloys; the cleaning of Alclad with paste etch; and pickling solutions for aluminum-base alloys.

22-334. The Development and Improvement of Spot Welding Electrodes. (Concluded.) G. F. James. *Sheet Metal Industries,* v. 24, June 1947, p. 1227-1230.

Microstructure of electrode tips; examination of physical and mechanical properties of electrode materials; effect of temperature on hardness.

22-335. Metal-Ceramic Vacuum Seals. Neal T. Williams. *Review of Scientific Instruments,* v. 18, June 1947, p. 394-397.

Wartime German vacuum-tube research led to the development of metal-ceramic silver-soldered vacuum seals. It has been found that such seals can be made successfully with ceramic materials available in this country. The procedure and precautions.

22-336. Spot Welders With Series Capacitors. F. L. Brandt. *Welding Journal,* v. 26, June 1947, p. 499-503.

Advantages of the equipment. Cost data are calculated, and operation of the equipment is shown by oscillograms.

22-337. Welding of Heavy Gray Iron Castings. L. J. Larson. *Welding Journal,* v. 26, June 1947, p. 504-511.

Sensitivity of gray iron to heat treatment limits use of welding. Nevertheless six methods have been successfully used for repair of gray-iron castings. These are: metallic-arc welding; oxy-acetylene welding; carbon-arc welding; bronze welding; thermit welding; and burning.

22-338. Rigid, Unique Water-Sphere Design Gained by Use of Electric-Arc Welding Process. A. F. Davis. *Welding Journal,* v. 26, June 1947, p. 512-513.

Fabrication and erection procedures.

22-339. The Effect of Welding Technique on Brittle Transition Temperature. Nicholas Grossman and Paul R. Shepler. *Welding Journal,* v. 26, June 1947, p. 321s-331s.

Twelve different methods were used to weld A-212 steel plates. Welding techniques could be divided into two general groups on the basis of the brittle transition temperature: E6010, E6020, and oxy-acetylene hand-weld-

ing showed that either the heat-affected zone or the weld metal was less ductile than the base plate; Unionmelt and HTS techniques both exhibited the most favorable conditions for applications where ductility is required with the weld metal more ductile than the unaffected plate. Speed of welding had little effect on the ductility of the weldments. 14 ref.

22-340. Effect of Welding on Ductility and Notch Sensitivity of Some Ship Steels. R. D. Stout, L. J. McGeady, C. P. Sun, J. F. Libsch and G. E. Doan. *Welding Journal,* v. 26, June 1947, p. 335s-357s.

Extensive report covers the effects of variables such as base plate, electrode type, heat input, power input, number of passes, and postheating; metallurgical structure and dissolved gas. Welded longitudinal notch bends and Charpy bars subjected to heat and atmosphere treatments are used.

22-341. A Preliminary Investigation of the Spot Welding of Scaly and Rusty Structural Steel. W. D. Doty and W. J. Childs. *Welding Journal,* v. 26, June 1947, p. 358s-362s.

Welds were made by a preheat and weld sequence involving variable current and pressure. Spot weld consistency was studied using scaly steel having little or no rust, and also with steel which was both scaly and rusty. It was tentatively concluded that with rust-free scaly steel, satisfactory spot welding can be accomplished with reasonable electrode life and weld strength consistency using a preheat and weld procedure. Welds made in rusty, scaly steel have poorer consistency and cause more rapid electrode deterioration.

22-342. Hot Cracking of 7% Aluminum Bronze Multi-Run Welds. E. C. Rollason and W. D. March. *Welding,* v. 15, June 1947, p. 252-256.

Effects of fluxes, of wire, and crystal-boundary effects evaluated experimentally.

22-343. The "Weldomat" Process. *Welding,* v. 15, June 1947, p. 257-260.

A new automatic arc welding process recently introduced in Great Britain. The equipment is especially suitable for work in shipyards.

22-344. Resistance Welding in Mass Production; Principles of Projection Welding. A. J. Hipperson and T. Watson. *Welding,* v. 15, June 1947, p. 261-270.

The range of projection welding and recommendations as to operating technique likely to produce the best results. The effect of the welding variables.

22-345. Jointing of Brass: A Survey of Methods and Applications. Edwin Davis. *Welding,* v. 15, June 1947, p. 271-279.

The techniques of joining copper-zinc alloys by brazing, gas welding, arc welding, and resistance welding.

22-346. Oxygen Cutting; Manual Methods. E. Seymour Semper. *Welding,* v. 15, June 1947, p. 280-285.

Hand-cutting methods and equipment.

22-347. Soldering and Brazing Stainless Steels. H. Seymour. *Industrial Chemist,* v. 23, June 1947, p. 369-372, 379.

Preparation of surface; importance of flux; corrosive nature of fluxes; procedure for various joints; butt joints; silver brazing; steel to steel joints; dangers due to overheating; different heating procedures.

22-348. Soldering Aluminum. G. W. Birdsall. *Iron Age,* v. 159, June 26, 1947, p. 53.

Recommended techniques.

22-349. Metal-Ceramic Brazed Seals. R. J. Bondley. *Electronics,* v. 20, July 1947, p. 97-99.

New method involves applying titanium hydride to ceramic, then brazing to metals or similarly prepared ceramics with silver or any other metal that melts at 1000° C. Resulting seal, gastight and stronger than ceramic itself, is ideal for microwave tubes.

22-350. Lead Welding Practices. *Linde Tips,* v. 26, July 1947, p. 73-79.

Some helpful suggestions for welding lead sheet and pipe.

22-351. A Circle-Cutting Attachment for the CM-16. *Linde Tips,* v. 26, July 1947, p. 82

How to make this device for the Oxweld cutting machine.

22-352. Aluminum Barrels by the Hundred. *Linde Tips,* v. 26, July 1947, p. 84-85.

Fluxless heliarc welding process eliminates postweld cleaning.

22-353. The Powder-Cutting Process. *Linde Tips,* v. 26, July 1947, p. 89-90.

Method for cutting stainless steels as easily as carbon steel.

22-354. Large Jobs Repaired by Bronze Welding. *Linde Tips,* v. 26, July 1947, p. 92-93.

Pictures and descriptive material illustrate several of the above.

22-355. Templet Tracing With a Portable Machine. *Linde Tips,* v. 26, July 1947, p. 95-96.

Rod templet and grooved-drive wheel which adapts portable cutting machine for stack-cutting of shapes.

22-356. Mechanized Bronze Welding. *Linde Tips,* v. 26, July 1947, p. 98-99.
Novel setup which speeds production of tube rings.

22-357. How to Select Hard Facing Materials. H. W. Sharp. *Iron Age,* v. 160, July 3, 1947, p. 62-66.
The four major groups of hard facing alloys and the general fields of application for each group. Photomicrographs show why each type possesses its particular characteristics. Current industrial applications; economic advantages.

22-358. Stainless Steel Welding Electrodes. *American Machinist,* v. 91, July 3, 1947, p. 147.
A.S.T.M. specifications.

22-359. Continuous Furnace Brazing. Part I. Design and Handling. C. L. West. *American Machinist,* v. 91, July 3, 1947, p. 124-125.
Metal products may be turned out at lower processing cost by using two or more parts in assembly by continuous brazing.

22-360. Pipe for the "Biggest Inch". Fred M. Burt. *Welding Engineer,* v. 32, July 1947, p. 33-37.
Production of 60-ft. sections of 30-in. pipe by Consolidated Steel Corp., Los Angeles, on an assembly-line basis, using specially designed machines for submerged-melt automatic welding.

22-361. Open-Circuit Voltage Goes Down. C. P. Croco. *Welding Engineer,* v. 32, July 1947, p. 38-41.
History of effort to secure lower voltages for a.c. welding. Using a stabilizing capacitor, it is now possible to operate at an open-circuit voltage of 55. (Condensation of paper presented at meeting of American Welding Society, Oakland, Calif.)

22-362. Beer From Welded Barrels. Edward F. Lee. *Welding Engineer,* v. 32, July 1947, p. 48-49.
Methods used in production of the barrels.

22-363. Ship Propellers Repaired by Brazing. Louis M. Friedmann. *Welding Engineer,* v. 32, July 1947, p. 50-52.
Details of the procedure developed at one large shipyard.

22-364. Three-Phase Welding. J. L. Solomon. *Steel,* v. 121, July 7, 1947, p. 94-96. 98, 137, 138, 140.
System puts balanced load on all three phases extending the scope of resistance welding processes and lowering substantially power demand.

22-365. Methods for Placing Brazing Materials, and Vent Locations. *Product Engineering,* v. 18, July 1947, p. 124-125.
Location and forms of copper used in brazing and positions for vents to prevent deformation of the final product. Two examples of joining dissimilar materials by brazing are given.

22-366. Nine Years of Strip Welding on the New Haven. A. L. Bartlett. *Railway Engineering and Maintenance,* v. 43, July 1947, p. 675-677.
Building-up battered rail ends. Experiences with strip welding and advantages. New electric slotter, light weight electric grinder, a tractor cylinder carriage, a rail grinder to remove corrugations, and a cutting-torch weld surfacer.

22-367. Continuous Furnace Brazing. Part II. How to Select and Apply Brazing Media. C. L. West. *American Machinist,* v. 91, July 17, 1947, p. 122-124.
Methods analysis for brazing saves time, money, and material by insuring proper application of media, heat, and equipment.

22-368. Brazing in Electric Furnaces. S. DeDomenico and J. A. Comstock. *Metal Progress,* v. 52, July 1947, p. 71-76.
Advantages of furnace brazing; atmospheres for furnace brazing; strength of brazed joints; metals and alloys which may be brazed; types of joints and production equipment.

22-369. Flame Cutting Structural Shapes in Quantity. *Steel,* v. 121, July 21, 1947, p. 100-101.
Equipment designed and built by Standard Steel Construction Co., Ltd., Port Robinson, Ont., for cutting large quantities of I and H-beams and channels at controlled speeds of 4 to 24 in. per min.

22-370. Furnace Brazing 12% Chromium Low Carbon Steel. T. H. Gray. *Steel,* v. 121, July 21, 1947, p. 105-106, 124, 127-128.
Tests in joining blades of steam-turbine rotors in order to modify their mechanical behavior reveal that by controlling brazing temperatures, 50 to 100% stronger joints are made. Turbine with brazed blades operated for 1000 hr. at 932° F. and 1250 psi. without failure.

22-371. Induction Soldering Speeds Kitchen Utensil Production. L. Gise and J. R. Stewart. *Industrial Heating,* v. 14, July 1947, p. 1098, 1100, 1102.
Methods used at Adel Precision Products Corp., Huntington, W. Va.

22-372. Use of Silver Alloys in Brazing. H. A. Smith and P. A. Koerner. *Aero Digest,* v. 55, July 1947, p. 54-56, 87.
Design principles and applications to aircraft construction.

22-373. Welding and Cutting. R. D. Williams. *Metals Review,* v. 20, July 1947, p. 5-8, 47.

Reviews eighteen months' progress as reflected in the technical literature. New features in various welding processes. Difficulties in welding different metals and alloys. Recent practice in brazing, soldering and cutting. Welding research and new applications of welding.

22-374. Welding Equipment. *Metals Review,* v. 20, July 1947, p. 9-11, 14-15, 17, 19.

150 new products and processes developed by the manufacturers for various types of welding electrodes and accessories. Timers, controls. Equipment for hard surfacing, cutting, brazing, soldering. Fixtures and positioners.

22-375. Arc Welding Modifies Flaptrack. *Automotive Industries,* v. 97, July 15, 1947, p. 37.

Fixture used for reworking a standard airplane stock part.

22-376. Constituents of Arc Welding Electrode Coatings. *Iron Age,* v. 160, July 24, 1947, p. 67.

Basic coating compositions of the fundamental electrodes and functions of the coating material in arc welding electrodes.

22-377. Theory of Heat Convection in Arc Welding. N. N. Rykalin. *Bulletin of the Academy of Sciences of U.S.S.R. (Section of Technical Sciences),* no. 1, 1947, p. 61-82. (In Russian.)

The theory proposed establishes the dependence of local heating and cooling of the welded materials on the conditions and rate of welding as well as on the shape and thermo-physical properties of the metals welded. The laws of heat convection during arc welding and temperature distributions. 11 ref.

22-378. Experiments on the Production of Lined Apparatus. E. M. Lapitskaia and I. I. Gerasimenko. *Avtogennoe Delo (Welding),* no. 1, 1947, p. 29. (In Russian.)

Both spot and linear-welding techniques were used for the application of corrosion resistant steel sheets to the interior of tanks.

22-379. Unscrewing Broken Pins With the Aid of Electric Welding. L. Z. Dolgitser. *Avtogennoe Delo (Welding),* no. 1, 1947, p. 30. (In Russian.)

Diagram illustrates repair technique.

22-380. Building up of a Hard Metal Alloy by Welding With High-Frequency Current. E. M. Kuzmak and A. I. Kurdin. *Avtogennoe Delo (Welding),* no. 3, 1947, p. 1-4. (In Russian.)

A method of hard surfacing for drill bits, using high-frequency current. Basic factors influencing the method and different methods for depositing hard metals and alloys.

22-381. Investigation of Electric-Arc Welding Under Flux. L. N. Kushnarev. *Avtogennoe Delo (Welding),* no. 3, 1947, p 5-9. (In Russian.)

Explanations of the above process found in the literature are conflicting. Investigation indicated that, depending on conditions, the process is either purely an arc process or the continuous passage of current through the flux without arc formation. In some cases these two processes may alternate.

22-382. Electrodes With Cellulose Coating. V. D. Taran. *Avtogennoe Delo (Welding),* no. 3, 1947, p. 10-13. (In Russian.)

Method of production of two new coated electrodes. The "OT-3" type (24.3% ground cellulose, 27.3% feldspar, 25.6% titanium dioxide, 10.5% magnesium oxide, 1.3% ground chalk, 5.4% potassium carbonate, and 5.6% ferromanganese), which may be used with direct or alternating current, is highly recommended.

22-383. Strong Butt-Welding Joints. N. N. Prokhorov, N. V. Shiganov, and A. V. Mordvintseva. *Avtogennoe Delo (Welding),* no. 3, 1947, p. 13-16. (In Russian.)

Defects of butt-welding joints; measures proposed for their elimination. Mechanical treatment of the shoulders of materials to be welded together.

22-384. Physics of the Welding Arc. M. Ia. Broun. *Avtogennoe Delo (Welding),* no. 3, 1947, p. 20-22. (In Russian.)

The fundamentals of the process of ionization in the welding arc. Introduction into the arc of elements having low ionization potential may give rise to a decrease in the amount of energy emitted, hence a decrease in the rate of welding. The importance of determining the optimum amount of stabilizing element in welding-rod coatings or fluxes. 10 ref.

22-385. Oxy-Acetylene Pressure Welding. A. S. Shchekanenko, A. L. Zilberberg, and Ia. N. Kogan. *Avtogennoe Delo (Welding),* no. 3, 1947, p. 23-26. (In Russian.)

Construction of apparatus for the process; the preparation of the ends of pipe for welding; the welding of the pipe, and control apparatus.

22-386. Surface Hardening With the Oxy-Acetylene Torch. S. V. Begun. *Avtogennoe Delo (Welding),* no. 3, 1947, p 27-28. (In Russian.)

Apparatus and techniques used in the U.S.S.R.

22-387. Flame Cleaning of Metallic Surfaces. S. G. Guzov. *Avtogennoe Delo (Welding),* no. 3, 1947, p. 28-30. (In Russian.)

Techniques and apparatus used in the U.S.S.R. A comparison of per-

formance and costs for two forms of burner—high-pressure and medium-pressure—showing that costs for the high-pressure type are slightly lower.

22-388. **Details of Design and Production of Commercial Equipment for Assembly and Welding.** N. I. Kazakov. *Avtogennoe Delo (Welding)*, no. 3, 1947, p. 31-32. (In Russian.)

Illustrated by several diagrams.

22-389. **Influence of the Basic Parameters of the Electric Arc and Thickness of the Electrode Coating on the Grain Size of Austenite of Weld Metal.** V. I. Strokopytov. *Avtogennoe Delo (Welding)*, no. 4, 1947, p. 1-7. (In Russian.)

Experimental investigation of various factors for low-carbon structural steel.

22-390. **Local Weakening of Welded Seams.** I. A. Lipetsky. *Avtogennoe Delo (Welding)*, no. 4, 1947, p. 8-12. (In Russian.)

Mechanism of formation of a series of defects in welded seams. Preventive measures.

22-391. **Rapid Manual Welding With Deep Penetration.** A. S. Chesnokor and A. D. Bondarenko. *Avtogennoe Delo (Welding)*, no. 4, 1947, p. 13-17. (In Russian.)

The technique of welding and the results obtained from a new method of manual electric welding using an ultra-short arc resulting in very deep heat penetration.

22-392. **Method for Manual-Arc Electric Welding With a Bundle of Electrodes.** V. S. Volodin. *Avtogennoe Delo (Welding)*, no. 4, 1947, p. 17-20. (In Russian.)

Process in which 2, 3, or 4 electrodes are fastened together, and its application to the welding of pipe lines.

22-393. **Production of Highly Efficient Electrodes for Manual Arc Welding.** N. M Sergeiev. *Avtogennoe Delo (Welding)*, no. 4, 1947, p. 20-23. (In Russian.)

A new type of double electrode with thin coating. Tests indicated the excellent quality of welding performed with these electrodes. Composition, method of production, and applications.

22-394. **Gaseous Corrosion of Welded Samples at High Temperatures.** G. N. Kulakova. *Avtogennoe Delo (Welding)*, no. 4, 1947, p. 23-25. (In Russian.)

Losses in weight due to atmospheric corrosion of welded specimens held at 800° C. for 100 hr. The three types were aluminum-coated (calorized) steel, a chromium-nickel steel, and a low-carbon steel. The structure of the specimens after exposure. Weight loss results.

22-395. **Concerning the Welding of "3M" Copper Steels.** N. N. Prokhorov and I. I. Makarov. *Avtogennoe Delo (Welding)*, no. 4, 1947, p. 25-27. (In Russian.)

Experimental setup shows properties of the base materials and of the weld metal resulting from use of different electrodes and techniques. Recommendations. The steels contained 0.16 to 0.25% Cu, 0.20 to 0.55% S, 0.18 to 0.53% P, 0.56 to 0.46% Mn, 0.02% Si, and 0.14 to 0.15% C.

22-396. **Electric-Arc Welding of Thin Sheets of "E. Ia. I. T." Stainless Steel.** F. E. Tretiakov. *Avtogennoe Delo (Welding)*, no. 4, 1947, p. 27-28. (In Russian.)

Experiments using two types of electrodes and variation of other factors in welding of steel containing 16 to 20% Cr, 8 to 11% Ni, 1.20% Si, 0.70% Mn, 0.5 to 0.8% Ti, 0.10% C, 0.03% S, and 0.03% P.

22-397. **Welding in Repair Work. Concerning Experiences in Electric-Welding Repair of Breaks in Metal Gasoline-Storage Tanks.** G. M. Shabanov. *Avtogennoe Delo (Welding)*, no. 4, 1947, p. 28-29. (In Russian.)

Diagrams indicate methods used.

22-398. **Welding of Cracks in High-Pressure Cylinders.** T. P. Trochun. *Avtogennoe Delo (Welding)*, no. 4, 1947, p. 29-30. (In Russian.)

Methods clarified by diagrams.

22-399. **Le Soudage a la Presse. (Pressure Welding.)** *Revue de l'Aluminium* v. 24, April 1947, p. 120.

A German method for producing airplane radiator parts by pressure welding. The alloy used was Pantal (0.79% Mg, 1.10% Si, 0.85% Mn, 0.39% Fe, 0.02% Ti, 0.13% Cu, 0.15% Zn, 0.05% Ni and balance Al). Other metals may be used with varying success.

22-400. **Jigs and Fixtures for Resistance Welding Machines.** Howard C. Cogan. *Tool Engineer*, v. 18, July 1947, p. 17-22.

Their design and construction.

22-401. **The Welding of Copper and Its Alloys. (Continued.)** E. G. West. *Sheet Metal Industries*, v. 24, July 1947, p. 1425-1429, 1435.

Copper-tin alloy welding; gas welding; arc welding; resistance welding; silicon-bronze welding; oxy-acetylene welding; carbon-arc welding; metallic-arc welding; resistance welding; and copper-aluminum alloy welding. 13 ref. (To be continued.)

22-402. **Some Fundamental Principles for the Resistance Welding of Sheet Metal. (Continued.)** H. E. Dixon. *Sheet Metal Industries*, v. 24, July 1947, p. 1430-1435.

Factors for resistance welding of aluminum-base alloys and for flash and butt welding of light alloys. 48 ref.

22-403. **Spot Welding of Some Aluminum and Magnesium Alloys.** H. Brooks.

Sheet Metal Industries, v. 24, July 1947, p. 1436-1440, 1442.

Summarizes a number of reports on investigations carried out by members of the LR.1 Committee of the British Welding Research Assoc. in connection with the spot welding of aluminum and magnesium alloys.

22-404. **The Design and Methods of Construction of Welded Steel Merchant Vessels.** *Welding Journal*, v. 26, July 1947, p. 569-618.

The final report of a Navy board of investigation. History; design; materials; construction; operating conditions; specific investigations; international exchange of information; findings; conclusions; opinions; recommendations; statistical report of structural failures on welded steel merchant vessels; summary of research investigations; survey of shipyard welding practices; and a classified bibliography. 53 ref.

22-405. **Silver Alloy Brazing Lawn Mower Rotors.** *Welding Journal*, v. 26, July 1947, p. 636.

The joining of three steel parts—a spider, drive shaft, and bearing retainer—in one operation.

22-406. **Note on the Influence of the Water Content of an Electrode Coating on the Hydrogen Content of Weld Metal.** W. P. van den Blink. *Welding Journal*, v. 26, July 1947, p. 369s-370s.

Calculation for compositions given by M. W. Mallett shows that addition of water to the arc atmosphere sometimes lowers the partial pressure of hydrogen, hence would reduce the hydrogen content of the weld metal. This is shown to be the case for electrodes of types E6010, E6013, and E6020. On the other hand, weld metal deposited by low-hydrogen electrodes should show higher hydrogen contents if water is added to the coating. Criticizes recent paper by Mallett and Rieppel.

22-407. **Contribution to the Study of Expansion and Contraction.** P. Berthet. *Welding Journal*, v. 26, July 1947, p. 370s-371s.

Results of French research on the shrinkage of various types of joints used in aircraft construction. How the shrinkage of large structures can be computed, from the results for individual tests. Joints in plates and tubes were studied for unalloyed steel, Cr-Mo steel, aluminum, and alloys of aluminum containing 3, 5, and 7% Mg. (Translated and condensed from *Soudure*, v. 1, 1947, p. 25-33.)

22-408. **An Investigation of Beams With Butt Welded Splices Under Impact. Part I. Impact and Static Tests on Beams With Butt Welded Splices and Plain Beams, Including Preliminary Studies of the Resistance to Impact at Subzero Temperatures.** W. J. Krefeld and E. C. Ingalls. *Welding Journal*, v. 26, July 1947, p. 372s-400s.

Results of investigation conducted at Columbia University.

22-409. **Auxiliary Tests on the Steels of I-Beams Tested in Flexural Impact at Columbia University.** George G. Luther, Wells E. Ellis, and Carl E. Hartbower. *Welding Journal*, v. 26, July 1947, p. 400s-408s.

Results of examination at the Naval Research Laboratory of the microstructure of I-beams. Charpy V-notched bars and high-constraint nick-bend specimens were also prepared from various sections of the beams and tested over a range of temperatures.

22-410. **An Investigation of Beams With Butt Welded Splices Under Impact. Part II. A Mathematical Treatment of the Generalized Hertz Impact of a Mass on a Simply Supported Beam.** M. G. Salvadori. *Welding Journal*, v. 26, July 1947, p. 409s-432s.

Approximate solution of the generalized Hertz central impact of a mass on a simply supported beam; impact on systems with a single degree of freedom; the Hertz generalized impact. 10 ref.

22-411. **Metallurgy of Arc Welding Using Thick Coated Electrodes.** A. S. Ogienetsky. *Avtogennoe Delo (Welding)*, no. 1, 1947, p. 7-11. (In Russian.)

Electrode coating and the physicochemical bases of metal-seam protectors. The influence of nitrogen, oxygen, and hydrogen, on the structure and properties of the seam metal. 12 ref.

22-412. **Deoxidation of the Seam Metal During Arc Welding.** A. A. Alov. *Avtogennoe Delo (Welding)*, no. 1, 1947, p. 12-16. (In Russian.)

The mechanism of oxidation and deoxidation of the seam during arc welding. Methods of deoxidation with carbon, silicon, and manganese.

22-413. **Cutting With an Oxygen-Lance.** K. K. Khrenov, G. B. Evseev, and M. S. Nikitin. *Avtogennoe Delo (Welding)*, no. 1, 1947, p. 21-24. (In Russian.)

This method, only slightly known in the U.S.S.R., was investigated to determine its applicability to low, medium, high-carbon and alloy steels. Hardness of medium and low-carbon steel is not markedly affected by oxygen-lance cutting, but high-carbon and alloy steels must be preheated to avoid cracks and loss of temper.

22-414. **Operation of the Structure-Welding Trust.** A. S. Falkevich. *Avtogennoe Delo (Welding)*, no. 1, 1947, p. 24-27. (In Russian.)

Methods of structural welding on oil and gas storage tanks, and welding in pipe line construction.

22-415. Beading of Bronze on Steel Surfaces by Means of an Electric Arc. V. A. Ivanov, A. V. Shadrin, and F. I. Shorin. *Avtogennoe Delo (Welding),* no. 1, 1947, p. 28. (In Russian.)

A new method of fusing anti-friction bronze to a steel surface.

22-416. Dependence of the Rate of Electrode Fusion on the Value of Internal Energy of the Crystal Lattice. I. A. Lipetsky. *Avtogennoe Delo (Welding),* no. 2, 1947, p. 1-3. (In Russian.)

A qualitative relationship was established for the above as a result of an experimental investigation. Further study is necessary to establish a quantitative relationship.

22-417. Investigation of the Automatic Welding of Thin Steel Plates Under a Layer of Flux. M. R. Shraerman and B. G. Iungelson. *Avtogennoe Delo (Welding),* no. 2, 1947, p. 3-6. (In Russian.)

Investigation to establish optimum conditions for automatic welding of thin (3 to 5 mm.) steel plates of two types. A Linde "Unionmelt" Type UM automatic welding machine was used.

22-418. Shunting of Current in Spot Welding. A. S. Gelman. *Avtogennoe Delo (Welding),* no. 2, 1947, p. 6-10. (In Russian.)

The above phenomenon, which affects the quality of spot welding, was investigated from the theoretical point of view, and verified experimentally. Recommendations for avoidance of shunting.

22-419. Automatic Welding in Boiler Construction. I. N. Gerasimenko. *Avtogennoe Delo (Welding),* no. 2, 1947, p. 18-19. (In Russian.)

A particular method for automatic welding of boilers used in a Soviet boiler works.

22-420. Cold Welding of Cast Iron With Combination Electrodes. P. I. Shorin. *Avtogennoe Delo (Welding),* no. 2, 1947, p 19. (In Russian.)

The preparation and constituents of the electrodes. Applications and advantages over other types.

22-421. A New Method for Fusing Powdered Hard Alloys Onto Irregular and Tapered Articles. A. G. Samvilov. *Avtogennoe Delo (Welding),* no. 2, 1947, p. 20. (In Russian.)

Apparatus and technique.

22-422. New Trend in Production of "E-50" Electrodes. K. O. Kostrzhitsky and A. N. Chistoserdov. *Avtogennoe Delo (Welding),* no. 2, 1947, p. 24. (In Russian.)

A new coating for low-carbon electrodes has been tried out with considerable success. Composition of the coating and results of testing.

22-423. A New Method for the Welding of Rail Joints. F. Wortmann. *Journal of the Iron and Steel Institute,* v. 156, June 1947, p. 261-270.

A brief review of arc welding practice in Switzerland. A method which does not require any interruption of traffic, nor special tools. The joints possess high fatigue strength. Results obtained on an experimental track.

22-424. Metallic Joining of Light Alloys. (Continued.) *Light Metals,* v. 10, July 1947, p. 365-366, 367-368.

Theory and techniques for flame welding of aluminum. Special attention to fluxing problems and to gases for the fusion process. (To be continued.)

22-425. How to Obtain High Speed Production With Low Temperature Silver Alloy Brazing. A. M. Setapen. *Industry and Welding,* v. 20, July 1947, p. 26-27, 60-64.

Handling practices, heating methods, and brazing procedures.

22-426. In the Plant Weldery. Part XI. *Industry and Welding,* v. 20, July 1947, p. 30-31, 34, 36, 38.

Methods used at B. F. Goodrich Co., Akron, Ohio, for repair, maintenance, and fabrication of tire-manufacturing equipment.

22-427. Mass Production of Automotive Parts. *Industry and Welding,* v. 20, July 1947, p. 40-41, 43-44.

Welding equipment and techniques used by Allison Div., General Motors Corp., Indianapolis, Ind.

22-428. Welded Pipe Fabrication; the Multipiece Welded Turn. Arthur R. Berry. *Industry and Welding,* v. 20, July 1947, p. 46-48.

How to figure the templet angle and length of elements, how to lay out the job and square the turn, why to avoid sharp turns, and where to lay out parts.

22-429. Induction Brazing. E. H. Hulse. *Western Machinery and Steel World,* v. 38, July 1947, p. 86-87.

Methods.

22-430. Torch Brazing Aluminum. Part I. Harry A. Huff. *Western Machinery and Steel World,* v. 38, July 1947, p. 88-92.

Advantages of the process; types of aluminum successfully torch brazed; joint strength and corrosion resistance; equipment and materials required; design considerations; jigs, fixtures, and positioners; procedure; high-speed production requirements; and present and future possibilities. (To be continued.)

22-431. New Flux Makes Easier the Soldering of Zinc-Coated Parts. *Materials & Methods,* v. 26, July 1947, p. 78-79.

The good wetting action of a new, noncorrosive flux known as "Never-Sever" results in strong joints on zinc coatings.

22-432. Joining Corrosion Resistant Alloys by Submerged Melt Welding. R. J. Anderson and H. J. Roberts. *Materials & Methods,* v. 26, July 1947, p. 89-92.

Applications of Unionmelt process.

22-433. Welding Avoids Three-Month Delay in Replacing Extruding Cylinder. *Modern Industrial "Press",* v. 9, July 1947, p. 6, 8.

Arc welding repair.

22-434. Structural Welding Research. Hugo W. Hiemke. *Western Metals,* v. 5, July 1947, p. 22-28.

Results of wartime research on welded ships. Welding research program; brittle fracture and restraint; brittle fracture and temperature; fabrication practices; effect of preheating; and residual welding stresses. 15 ref.

22-435. Safe-Ending Large Diameter Locomotive Flues. *Steel,* v. 121, July 28, 1947, p. 75.

Welding operation which combines flashing and upsetting to process some 60 flues per hr.

22-436. Practical and Economical Aspects of Furnace Brazing Processes. C. L. West. *Steel Processing,* v. 33, July 1947, p. 412-416, 423.

Design factors and methods of handling assemblies; surface conditions required; the brazing medium and its application; selection of brazing medium and flux. (To be continued.)

22-437. Improved Products by Mechanized Welding and Cutting. Earl Griffeth. *Steel Processing,* v. 33, July 1947, p 427-430, 436.

Use in manufacture of heavy-duty earth-moving equipment.

22-438. All-Welded Ship Repairs. *Welding,* v. 15, July 1947, p. 330-331.

Repairs recently made on American ship.

22-439. Progress in Research. *Welding,* v 15, July 1947, p. 334-336.

A survey of recent welding investigations.

22-440. Bonding Rubber to Metal With Ty-Ply. Robert Shattuck. *Rubber Age,* v 61, July 1947, p. 451-454.

Use of this adhesive composition; test data on bond characteristics.

22-441. Les Scellements Ceramique Metal. (Ceramic-Metal Seals.) M. Kuhner. *Le Vide—Technique-Applications,* v. 2, Jan. 1947, p. 194-204.

Advantages of using ceramic material instead of glass in the construction of high-frequency tubes. The direct brazing of ceramic-metal seals.

22-442. Mechanized Oxy-Acetylene Soft Soldering. *Sheet Metal Worker,* v. 38, July 1947, p. 51-52.

(Reprinted from *Linde Tips.*)

22-443. Soldering Paste "Mosenergo". *Industrial Power (U.S.S.R.),* no. 3, 1947 p. 14-15. (In Russian.)

A newly developed paste for use in joining copper, lead, and other metals, specifically in electrical installations. The composition is: resin, 10 parts; animal fat, 5 parts; ammonium chloride, 2 parts; zinc chloride, 1 part; and water, 1 part.

22-444. Stresses in Welded Structures. A. Nikolaev and N. N. Proklorov. *Bulletin of the Academy of Sciences of U.S.S.R. (Section of Technical Sciences),* no. 3, 1947, p. 307-318. (In Russian.)

By means of a deflectometer, the deformation of welded specimens was measured as a function of time and temperature of base metal during welding. A relationship was established between the dimensions of the weld specimen, the alloying effects of nickel, and the magnitude of residual stresses. It was found that residual stresses in the weld are appreciably lowered by cooling the seam with water at the time the bead is being deposited.

22-445. British Shipbuilding. Part I. Vickers-Armstrongs' Naval Construction Works. L. Redshaw. *Welding,* v. 15, July 1947, p. 294-306.

The economic requirements for introduction of welding into a shipyard building passenger liners where repetition of a particular design is unusual.

22-446. Resistance Welding in Mass Production; Projection Welding Machines. A. J. Hipperson and T. Watson. *Welding,* v. 15, July 1947, p. 307-313.

Fundamental principles. Examples of the latest types of equipment and their particular application. The most recent multi-station indexing types of machine.

22-447. Structural Alterations; Arc Welding Solves Workshop Problem. E. E Wright. *Welding,* v. 15, July 1947, p. 314-316.

How important structural alterations to a workshop were carried out by arc welding.

22-448. Boiler Repairs. J. K. Johannesen. *Welding,* v. 15, July 1947, p. 323-325.

Examples of welding maintenance work.

22-449. Oxygen Cutting. Part XII. E. Seymour Semper. *Welding,* v. 15, July 1947, p. 326-329.

Manual methods of cutting cast iron and stainless steel.

22-450. Methods for Maintaining Positions and Dimensions of Parts During Brazing. *Product Engineering,* v. 18, Aug. 1947, p. 120-121.

Welding and assembly techniques, permanent and temporary methods of support, and instances of poor practice.

22-451. Electric Furnace Brazing Aids Manufacture of Insecticide Bombs. Harold J. Mallia. *Modern Machine Shop,* v. 20, Aug. 1947, p. 132, 134, 136, 138.

Advantages of furnace brazing over local heating for this application; procedure.

22-452. Prefabricated Truss Spans. H. Bowden Fletcher. *Welding Engineer,* v. 32, Aug. 1947, p. 33-37.

Prefabrication procedures for two 440-ft. truss spans.

22-453. Batting Out Bug Bombs. Athel F Denham. *Welding Engineer,* v. 32, Aug. 1947, p. 38-39.

How special six-station fixtures index automatically for the rapid assembly of one-shot, one-room, D.D.T. insecticidal bombs by projection welding.

22-454. Welded Lighting Installation. Alfred A. Wald. *Welding Engineer,* v. 32, Aug. 1947, p. 40-42.

Construction of welded channels for conductors for fluorescent lighting in the drafting department of Caterpillar Tractor Co.

22-455. Metal Cutting With the Metal Arc. T. B. Jefferson. *Welding Engineer,* v. 32, Aug. 1947, p. 45-47.

Procedures and applications of the Arcos "Oxyarc" process in which a stream of oxygen is directed into a pool of molten metal which is made and kept molten by an arc between the base metal and the coated tubular rod. Current settings and oxygen pressures for different metals.

22-456. Glycerine and Welding. Georgia Leffingwell and Milton A. Lesser. *Welding Engineer,* v. 32, Aug. 1947, p. 52, 54-55.

Uses of glycerine and its compounds in welding include spatter preventives, ultraviolet protective paint, fire resistant fabrics, welding curtains, anti-fogging compounds, and bonding agents for abrasives. 22 ref.

22-457. Transformers for Submerged-Melt Welding. R. F. Wyer. *Welding Engineer,* v. 32, Aug. 1947, p. 56-58.

How to select the proper sizes of welding transformers for a submerged-melt welding installation. Practical information on selection of control equipment.

22-458. A Study of Furnace Brazing as Applied to 12% Chromium Low-Carbon Steel. T. H. Gray. *Transactions of American Society for Metals,* v. 39, 1947, p. 453-478; discussion, p. 478-487.

Tensile and rupture tests on copper-brazed specimens of 12% chromium steel prepared in different manners. Strong, sound brazed joints are produced between impulse blades of a steam turbine operating at a steam temperature of 930° F. and pressure of 1250 psi. Effects of varying the smoothness of adjoining surfaces, method of feeding, spacing of joints, degree of oxidation, and composition of the brazing alloys were studied. High-purity gases possessing dew points of minus 35° C. or better are required to successfully braze high-chromium steels. The use of dissociated ammonia as a protective atmosphere.

22-459. Pressure Welding of Stainless Steel. Arnold L. Rustay. *Metal Progress,* v. 52, Aug. 1947, p. 238-242.

Pressure welding or solid phase welding is the fundamental process involved in powder metallurgy; in this article, however, the meaning is restricted to the welding of bars, tubes or other commercial shapes into mechanical parts by heating the joint with a gas flame and pressing the parts together.

22-460. Large Herringbone Gear Fabricated by Welding. *Iron Age,* v. 160, Aug. 7, 1947, p. 83.

Fabrication of unusually large steel gears.

22-461. Shop Shots at Day and Night. *American Machinist,* v. 91, Aug. 14, 1947, p 94-95.

Use of automatic welding in manufacture of 20-gal. water-heater boilers at Day and Night Mfg. Co., Monrovia, Calif.

22-462. Welding Research Strength of Spot Welds in M.S. Sheet; Welded Stanchion Joints; Welded Constructions Under Fatigue Loading Conditions; Heat Treatment of Welded Constructions. *Transactions of the Institute of Welding B.W.R.A. Supplement,* v. 10, June 1947, p 2, 5.

A résumé of four recent reports.

22-463. New Full and Semi-Automatic Welding Machines. P. Sevibo and V. Paton. *Engineers' Digest (American Edition),* v. 4, July 1947, p. 315-322.

Three new types of welding machinery developed in the U.S.S.R. The "Combined Welding Automat UWA-2" is produced in two forms—for self-propulsion along a track, or stationary. The "Welding Tractor TS-6" is used for welding continuous longitudinal or circumferential welds of work too large for bed-type machines. The "Welding Semi-Automat TS-8" is still in the experimental stage. (Translated and condensed from a publication of the Institute of Electro-Welding, Ukrainian Academy of Sciences, U.S.S.R. 32 pages. 1946.)

22-464. Some Effects of Welding Heating Cycles on Heat and Corrosion Resisting

Steels. H. Bull. *Metallurgia,* v. 36, July 1947, p. 137-144.
The three main types of steels used, and some effects of the welding heat on material adjacent to the weld. Changes in structure, corrosion resistance, and mechanical properties; metallurgical steps taken to overcome them.

22-465. **Effect of Variables in Welding Technique on the Strength of Direct-Current Metal-Arc Welded Joints in Aircraft Steel. Part I. Static Tension and Bending Fatigue Tests of Joints in S.A.E. 4130 Steel Sheet.** C. B. Voldrich and E. T. Armstrong. *National Advisory Committee for Aeronautics Technical Note No. 1261,* July 1947, 52 p.
Arc welded butt joints in ⅛-in. S.A.E. 4130 steel sheet, which were made under various conditions of welding and heat treatment, were tested to evaluate the effects of specific welding-technique factors on the strength of the joints.

22-466. **Welding Steel Trailer Door Frames Increases Strength, Saves Weight.** Athel F. Denham. *Materials & Methods,* v. 26, Aug. 1947, p. 93-96.
The development of three universal-type automatic spot welding machines to assemble the basic framework of the door frames supplemented by a turntable-type fixture at which various brackets are attached with portable welding guns.

22-467. **Light Material—Heavy Production.** Joseph Weindl. *Industry and Welding,* v. 20, Aug. 1947, p. 26-29, 46.
Forming and fabrication of miscellaneous sheet metal products by Western Metal Specialty Co., Milwaukee. Emphasis on resistance welding.

22-468. **When and How to Mechanize Hard Facing Operations.** Eldon Hurt. *Industry and Welding,* v. 20, Aug. 1947, p 30-32, 44, 46.
Important factors in mechanizing hard facing operations. (To be continued.)

22-469. **The Art of Ornamental Iron Welding.** *Industry and Welding,* v. 20, Aug. 1947, p. 40-42, 76-79.
Some techniques used by Florida Mfg. and Welding Co.

22-470. **Welded Pipe Fabrication. The Multi-Piece Welded Turn.** Arthur R. Berry. *Industry and Welding,* v. 20, Aug. 1947, p. 48, 50, 52.
Various methods for closing the end of a pipe line.

22-471. **Torch Brazing Aluminum. Part II.** Harry A. Huff. *Western Machinery and Steel World,* v. 38, Aug. 1947, p. 80-84.
Joint design; jigs, fixtures, and positioners; four major steps in torch brazing of aluminum, namely, pre-brazing cleaning, fluxing, flowing the filler metal, and post-brazing cleaning.

22-472. **Coordinated Development of A.C. Welders and Electrodes.** C. P. Croco. *Western Machinery and Steel World,* v. 38, Aug. 1947, p. 92-95.
Absence of arc blow, lower power consumption, and lower maintenance costs are three advantages a.c. welding has over d.c. Advances made to coordinate a.c. welders and suitable electrodes.

22-473. **A Useful Approach to Resistance Welding.** B. G. Higgins. *Sheet Metal Industries,* v. 24, Aug. 1947, p. 1639-1642.
Spot welding is the most widely used of the resistance welding processes. The advent of electronic control opened up new possibilities in resistance welding through its ability to give precise and accurate timing of the welding current. (To be continued.)

22-474. **The Welding of Copper and Its Alloys. Part VIII.** E. G. West. *Sheet Metal Industries.* v. 24, Aug. 1947, p. 1643-1645.
Arc welding of copper-aluminum alloys, carbon-arc welding and resistance welding.

22-475. **Discussion of Technical Papers on the Spot Welding of Light Alloys, Presented at the Third Session of the British Welding Research Association; Symposium on the Welding of Light Alloys.** *Sheet Metal Industries,* v. 24, Aug. 1947, p. 1650-1654, 1656.
Uses, advantages, strength, and effectiveness of spot welding of light alloys.

22-476. **A.C. Welding Development.** C. P. Croco. *Western Metals,* v. 5, Aug 1947, p. 34-36.
A review of early experiments, recent advances, and advantages of a.c. over d.c. welding.

22-477. **Practical and Economical Aspects of Furnace Brazing Processes. Part II.** C. L. West. *Steel Processing,* v. 33, Aug. 1947, p. 492, 498.
Strength of brazed joints; carburizing brazed assemblies and the prevention of decarburization; temperature conditions in regard to brazing applications; furnaces.

22-478. **Radiographic Weld Control for Pipe Line Construction.** Walter W. Offner. *World Oil,* v. 126, Aug. 18, 1947, p. 114, 118, 121.
Some highlights and economic advantages of this process.

22-479. **Inert-Arc Welding With Direct Current.** R. F. Wyer. *Iron Age,* v. 160, Aug. 21, 1947, p. 68-70.
Methods of applying this technique to stainless steel, copper, aluminum, and magnesium. Recommended amperage and welding speed; helium

consumption; electrode size; type of gas; welding generator; electrode holder and electrode.

22-480. Arc Welding Is Being Handicapped. James F. Lincoln. *Scientific American,* v. 177, Sept. 1947, p. 101-105.

Limitations and restrictive tests placed upon arc welded joints, but not on similar joints designed for similar purposes and completed by riveting.

22-481. Silver Plating Facilitates Bonding Glass to Steel. Norman S. Freedman. *Steel,* v. 121, Aug. 25, 1947, p. 92, 94.

Study of adherence of silver to steel shows that bond is improved when diffusion of silver into iron and iron into silver takes place by heating.

22-482. Specification Changes. R. H. Davies. *Steel,* v. 121, Aug. 25, 1947, p. 96, 101, 120.

The adoption of arc welding in the fabrication of fire trucks reduces the amount of tooling required to make specification changes.

22-483. In Welding Stainless Steel Containers Distortion Can Be Controlled. L. K. Stringham. *Sheet Metal Worker,* v. 38, Aug. 1947, p. 51-52.

A procedure table.

22-484. Metallic Joining of Light Alloys. *Light Metals,* v. 10, Aug. 1947, p. 421-424. (Continued.)

Gas welding of aluminum alloys The need for removing all flux residues after completion of the work. (To be continued.)

22-485. Correct Technique Necessary for Stainless Welding. L. K. Stringham. *Iron Age,* v. 160, Aug. 28, 1947, p. 61-63.

Practices to be followed, the electrodes to be used, and the preheat and postheat temperatures for each main type of stainless steel to obtain maximum corrosion resistance and structural strength.

22-486. Arc Welding in Making Aluminum Doors. M. N. Vuchnich. *Light Metal Age,* v. 5, Aug. 1947, p. 10.

The welding of the framework of aluminum overhead industrial doors consists of butt welding the flanges and intermittently fillet welding the webs, the mating components being coped to provide a finished flush surface on both the inside and the outside. Small triangular gussets are butt welded into position wherever they are required for the support of standard steel strap hinges.

22-487. Improved Products by Mechanized Welding and Cutting. Earl Griffeth. *Welding Journal,* v. 26, Aug. 1947, p 670-674.

Use of mechanized welding and cutting in the manufacture of a complete line of heavy-duty earth-moving equipment.

22-488. Coordinated Development of A.C. Welders and Electrodes. C. P. Croco. *Welding Journal,* v. 26, Aug. 1947, p. 680-683.

Absence of arc blow, lower power consumption and lower maintenance costs are three advantages a.c. welding has over d.c. welding. The absence of arc blow when using high currents, and when welding in corners. is a characteristic that for some time has been recognized as a major advantage of a.c. welding. The efficiency of a transformer compared to a motor-generator set.

22-489. The Electric Welding of Pipe. Omer Blodgett. *Welding Journal,* v. 26, Aug. 1947, p. 684-689.

Prefabrication of piping is used with great success in shipbuilding and can be utilized equally well in industrial and home piping. More welding is possible for industry and home service than for shipbuilding because many valves, strainers, and other parts in ships must be connected by flanges so that they can be taken off at regular intervals for cleaning and inspection Piping in a diesel-driven, ocean-going ship.

22-490. S-Curves Point the Way for Successful Welding of Any High-Carbon or Alloy Steel. Leo Berner. *Welding Journal,* v. 26, Aug. 1947; discussion, p. 689-692.

Critical comments on paper appearing in Feb. 1947 issue with author's reply.

22-491. Work Supports for Machine Cutting. J. A. Arnault. *Welding Journal,* v. 26, Aug. 1947, p. 696-697.

Supports for oxy-acetylene shape cutting must meet two basic requirements—they must be level and steady and they must hold the work in a manner that will not interfere with clear passage of the cutting oxygen stream through the material being cut.

22-492. Vital Parts for Coal Loader Unit Are Fabricated by Automatic Welding Arc. C. W. Lytton. *Welding Journal,* v. 26, Aug. 1947, p. 698-699.

Fabrication of the gathering head assembly for a coal loader. By applying the current process of automatic metallic arc welding, daily production of these vital parts was doubled, positive accuracy of alignment of the various members was obtained and the labor cost per piece was materially reduced.

22-493. Observations of Electrode Tip Pickup and Tip Life in the Spot Welding of Magnesium Alloy Sheet. W. F. Hess, T. B. Cameron, and R. A. Wyant. *Welding Journal,* v. 26, Aug. 1947, p. 433s-442s, 484s.

Methods for evaluating the useful

life of an electrode tip when spot welding magnesium sheet; the comparative tendencies for sheet of different compositions and tempers to cause pickup; the influence of preweld cleaning method, surface resistance and weld size on tip life; the importance of welding current direction; the effect of pickup on the production of sound welds.

22-494. Transverse Shrinkage of Welds. F. Campus. *Welding Journal*, v. 26, Aug. 1947, p. 485s-488s.

Numerical data for several types of butt and fillet welds made under a variety of conditions.

22-495. Production Jobs for Inert-Gas Shielded-Arc Welding. H. T. Herbst. *Steel*, v. 121, Sept. 1, 1947, p. 72-74, 92, 94, 96.

New process uses argon or helium sheath to protect electrode and weld puddle in welding stainless, high-carbon and alloy steels, aluminum, brass, Inconel, monel, everdur, and pure silver.

22-496. Increasing the Durability of Rotor Blades of Boiler Exhaust Fans. B. M. Kontorov and I. I. Rafalvich. *Industrial Power (U.S.S.R.)*, v. 4, July 1947, p. 10-11. (In Russian.)

Superior welding-rod compositions for fabrication of rotor blades. Stalinite—a Cr-Mo-V alloy—was good, but was in short supply. Three other alloys were developed and tested. The most satisfactory contained 5% boron carbide and was found to be 2 to 2½ times more durable than Stalinite.

22-497. Oxyarc Cutting; an Important New Development. R. N. Thompson. *Welding*, v. 15, Aug. 1947, p. 344-349.

Details of special equipment and possible applications; operating data.

22-498. Spot Welding Steel With an Alloy Content. C. A. Kershaw. *Welding*, v. 15, Aug. 1947, p. 350-355.

Difficulties encountered when spot welding steels containing small amounts of alloy. A metallurgical investigation into the causes. Postheating was adopted with satisfactory results.

22-499. Choose the Right Electrode; a Guide to Properties and Applications. W. D. Waller. *Welding*, v. 15, Aug. 1947, p. 356-365.

Disadvantages of the various British and American standard specifications and classifications. The various types of mild and low-alloy steel electrodes and their special characteristics and uses. (To be continued.)

22-500. Resistance Welding in Mass Production; Projection Welding Electrodes. A. J. Hipperson and T. Watson. *Welding*, v. 15, Aug. 1947, p. 366-374.

Design, arrangement, and maintenance of electrodes.

22-501. Electro-Physics of the Welding Arc; Trends of Recent Research. L. H. Orton. *Welding*, v. 15, Aug. 1947, p. 375-379.

Based in part on a paper presented at a symposium held by the British Welding Research Association in 1945. 41 ref.

22-502. Oxygen Cutting; Underwater Cutting Methods. E. Seymour Semper. *Welding*, v. 15, Aug. 1947, p. 380-385.

Principles and equipment; operating data and some information regarding German developments.

22-503. Spot Welding French Autos. Michael Marsh. *Welding Engineer*, v. 32, Sept. 1947, p. 33-37.

Renault uses chiefly spot welds, supplemented by arc welding, to put together 80 lightweight Juvaquatre cars daily. Each of these small cars contains about 4750 spot welds.

22-504. Silver Brazing Kitchen Faucets. Fred M. Burt. *Welding Engineer*, v. 32, Sept. 1947, p. 42-45.

Silver brazing lends itself very well to mass production on continuous assembly lines. Use of gas-air radiant burners to heat the alloy to brazing temperature.

22-505. Education for Welding Personnel. Part I. Walter J. Brooking. *Welding Engineer*, v. 32, Sept. 1947, p. 51-53.

LeTourneau Technical Institute's highly effective plan for the training of welding engineers and production specialists combines classroom instruction, on the college level, with paid part-time employment.

22-506. Flux-Injection Cutting. Part I. G. E. Bellew. *Welding Engineer*, v. 32, Sept. 1947, p. 60, 62-63, 74, 76.

Process makes possible flame cutting of stainless steels on a production basis by injecting powdered flux via the cutting-oxygen stream.

22-507. Flames for Welding. T. Courard. *Engineers' Digest (American Edition)*, v. 4. Aug. 1947, p. 370-374.

The comparative thermodynamic qualities of the flames utilized in gas welding and their influence on different metals. Although the results of this study are of a highly theoretical character because they are based on the assumption that physico-chemical equilibrium is reached, they are of great interest to the practical welder because they show the general tendency of actual phenomena. (Translated and condensed from *Revue de la Soudure*, no. 1, 1945, p. 22-33.)

22-508. Electric Resistance Welded Steel Tubing. E. W. Allardt. *Iron and Steel Engineer*, v. 24, Aug. 1947, p. 55-64; discussion, p. 64-66.

Operations in the making of welded steel tubing; its advantages and uses.

22-509. Low Temperature Silver Alloy Brazing. *Steel,* v. 121, Sept. 8, 1947, p. 76-77, 108, 110.

Several production techniques, in some cases realizing savings as high as 50%.

22-510. Welding With Superimposed High Frequency Current by Means of the Polytrode. *Engineering Materials and Processes,* v. 5, Aug. 1947, p. 83-84.

Several advantages for the Polytrode, in which a spark gap high-frequency generator is used to provide high-frequency power.

22-511. Applications of Flux-Injection Cutting to Stainless Steel. G. E. Bellew *Canadian Metals & Metallurgical Industries,* v. 10, Aug. 1947, p. 16-19.

Selection of a fluxing agent and the equipment for applying this flux Comparison of flux-injection cutting with normal oxy-acetylene cutting techniques. The principal current uses. Quality of cut obtained and the effect of the cutting action on various types of stainless steel.

22-512. Hydraulic Pressure Provides Uniform Welds. *Steel,* v. 121, Sept. 15, 1947, p. 104.

New welding gun eliminates destructive burning and pitting at the point of the weld in spot welding. Uniform hydraulic pressure is applied to the points.

22-513. How Pressure Welding Works. *Engineering and Mining Journal,* v. 148, Sept. 1947, p. 77.

Steps in the process; operating principle; equipment; applications.

22-514. Automatic Welding Speeds Tank Production. *Industry and Welding,* v. 20, Sept. 1947, p. 26-29.

Procedures and equipment used by Butler Mfg. Co. in fabrication of propane tanks.

22-515. Repair, Maintenance, Fabrication in the Plant Weldery. No. 12. Anheuser-Busch, Inc., St. Louis, Mo. *Industry and Welding,* v. 20, Sept. 1947, p 30-32, 47-48.

Procedures and equipment.

22-516. Spot Welding Specialists. T. P. Cullin. *Industry and Welding,* v. 20, Sept. 1947, p. 34-35, 38, 64-65.

Operations of Spotweld, Inc., Cleveland, in production of miscellaneous aluminum consumer goods.

22-517. Technique for Welding 11 to 14% Manganese Steel. Robert Bramley. *Industry and Welding,* v. 20, Sept. 1947, p. 40-42, 44.

Weaving; short, heavy beads; peening. A detailed procedure for rebuilding dipper teeth.

22-518. This Welder Has Multiple Take-Off. J. C. Albright. *Power,* v. 91, Aug. 1947, p. 108.

Arrangement for oxy-acetylene welding outfit which permits use of more than one welding or cutting tip at the same time with only one set of regulators and gas cylinders.

22-519. Positioner Holds Parts in Easy Welding. A. J. Beldon. *Power,* v. 91, Aug. 1947, p. 109.

Versatile welding jig made of angle iron.

22-520. Manual of Terminology and Abbreviations: Bolts, Nuts, Screws, Rivets, and Related Fasteners Products. *Fasteners,* v. 4, no. 2, 1947, p. 11-14.

22-521. Sems. Walter M. Hanneman. *Fasteners,* v. 4, no. 2, 1947, p. 4-7.

A screw, when combined with a washer into one unit, is called a sem. Numerous types and applications.

22-522. Threading of High-Temperature Bolt Studs. K. D. Williams. *Fasteners,* v. 4, no. 2, 1947, p. 8-10.

Results of load-deformation tests for several bolt and nut combinations (¾-in., 10 threads per in., with 3, 4, 5, and 6 threads engaged).

22-523. Welded Steel Furniture. Dan Raffone. *Welding Journal,* v. 26, Sept. 1947, p. 761-766.

Procedures and equipment used by Simmons Co., Kenosha, Wis., in fabrication using various types of welding and brazing.

22-524. How to Select Good Operating Current Levels for Use With Tungsten Electrodes in Inert-Arc Welding. R. W. Tuthill. *Welding Journal,* v. 26, Sept. 1947, p. 766.

Chart shows current levels that have been used for manual welding in the General Electric welding laboratory for several years, and gives current levels for each electrode size.

22-525. Arc Welding Used in Renovation of Railroad Equipment. A. L. Champigny. *Welding Journal,* v. 26, Sept. 1947, p. 776.

Procedures and equipment used by International Railway Car and Equipment Manufacturing Co.

22-526. Lead Welding Practices. L. S. Bowser. *Welding Journal,* v. 26, Sept. 1947, p. 777-781.

Recommended techniques for various forms (sheet, pipe, etc.), including surface preparation.

22-527. All-Welded Structure in Canada Leads in Economy, Strength and Appearance. M. N. Vuchnich. *Welding Journal,* v. 26, Sept. 1947, p. 782-783.

Design details on the first all-welded structure of its kind in Canada —entirely fabricated by arc welding and without the use of erection bolts. This structure will house new shops for the manufacture of farm implements and equipment.

22-528. Failures in Guided Bend Qualification Test Often Due to High-Tensile Pipe. L. K. Stringham. *Welding Journal,* v. 26, Sept. 1947, p. 784-785.

Test shown to be unsatisfactory for use in tryouts for welding personnel, or for electrode evaluation. It can be made to fail a good operator or pass a poor one by proper choice of pipe.

22-529. All-Welded Metal Casket. W. P. Brotherton. *Welding Journal,* v. 26, Sept. 1947, p. 786-787.

Production of high-quality, chromium-nickel alloy casket shells on a moving assembly line similar to that used in the manufacture of automobiles.

22-530. A Weldability Test for Sheet Metal in Oxy-Acetylene Welding. R. Woirin. *Welding Journal,* v. 26, Sept. 1947, p. 790.

An evaluation of the test proposed by Linde Air Products Co. in 1930, in which a 6-in. square sheet is fused without burning and a hole then melted in it. Present research indicates desirability of using diameter of hole rather than time of perforation as a criterion of weldability. (Translated and condensed from "Un Essai de Sondabilite Operatoire", *Sondureet Technique Connexes,* v. 1, March-April 1947, p. 48-55.)

22-531. Inert-Arc Welding Stainless Steel Belt. M. J. Conway. *Welding Journal,* v. 26, Sept. 1947, p. 791-792.

Technique used for job in which a 200-ft. strip of Type 302 stainless steel, 36 in. wide and 0.30 in. thick, was successfully welded into an endless belt by using the inert-arc welding process with the sheets slightly overlapped at the start of the weld.

22-532. Notched-Bead Slow-Bend Tests of Carbon-Manganese Steels. C. B. Voldrich, D. C. Martin and O. E. Harder. *Welding Journal,* v. 26, Sept. 1947, p. 489s-507s.

Usefulness of the test; effects of C and Mn on weldability; and effects of notch depth and of plate thickness. Variations between normalized and as-rolled specimens, and the effects of different heat inputs and different types of electrodes.

22-533. A Note on the Shrinkage and Distortion of Welded Joints. F. Guyot. *Welding Journal,* v. 26, Sept. 1947, p. 519s-529s.

A theoretical and experimental analysis. Application of the curves and equations developed to a number of practical problems. (Translated from *Arcos,* no. 100, 1946, p. 2357-2380; no. 101, 1946, p. 2399-2404.)

22-534. $H = kRI^2t$. A Useful Approach to Resistance Welding. (Concluded.) B. G. Higgins. *Sheet Metal Industries,* v. 24, Sept. 1947, p. 1843-1852.

Formula for the heat involved in resistance welding. Preparation of good fits between parts to be welded; electrode-tip diameter; electrode pressure and current initiation; mechanical and air-operated machines; mechanical toggle-operated machines; forging pressure; welding current; oscilloscope tests; results of excessive contact resistance; a common cause of bad welds; power-factor correction; welding time; ignitron contactors; electronic control of seam welders.

22-535. The British Welding Research Association's Symposium on the Welding of Light Alloys. The Welding of Aluminum-Magnesium Alloys. E. A. G. Liddiard. *Sheet Metal Industries,* v. 24, Sept. 1947, p. 1857-1860, 1862.

A condensed description of work done during the past three years. Data on the favorable mechanical properties of the Al-Mg alloys, and the principal difficulties in making sound welds. Studies of the nature of the oxide film and of surface reactions with moisture at elevated temperatures show that blistering is due to absorption of hydrogen by the alloys at various stages of fabrication. The extent of the gas absorption increases with the magnesium content and is affected by certain alkali and alkaline-earth-metal impurities. Recommendations are made to minimize the trouble and data are given showing the properties of welds made by the recommended methods.

22-536. The Welding of Lead. *Machinery Lloyd (Overseas Edition),* v. 19, Aug. 30, 1947, p. 84-86.

Techniques and applications.

22-537. Selecting Current for Inert-Arc Welding With Tungsten Rods. *Iron Age,* v 160, Sept 25, 1947, p. 76.

Chart shows current levels for each electrode size.

22-538. Controlling Weld Metal When Making Repairs. *Power Plant Engineering,* v. 51, Aug. 1947, p. 92-93.

Use of carbon in the form of paste, plates, and rods as an aid in the control of the welding puddle.

22-539. I Principi della Saldatura Ossiacetilenica delle Leghe Leggere. (The Principles of Oxy-Acetylene Welding of Light Alloys.) *Alluminio,* v. 16, May-June 1947, p. NdO 65-NdO 89.

A general discussion of autogenous welding, with special reference to aluminum and its alloys. 11 ref.

22-540. Safety-Weld Coupling on Pipe-Line Maintenance Work. J. B. Smith. *Oil and Gas Journal,* v. 46, Sept. 20, 1947, p. 193-194, 240.

New procedure and device for welding joints in pipe lines in service and under pressure.

22-541. Welding Metallurgy. J. G. Ball. *Metal Industry,* v. 71, Sept. 5, 1947, p. 199-202.

Recent progress in the nonferrous alloy field. 10 ref. (To be concluded.)

22-542. Welding and Marine Engineering; an Examination of Present Tendencies. A. C. Hardy. *Welding,* v. 15, Sept. 1947, p. 399-407.

The application of welding in relation to recent developments in marine engine construction. The present and future possibilities of fabricated units from the point of view of economic engine design.

22-543. British Shipbuilding. Part 2; The Harland and Wolff Yards, Belfast. E. Cuthbert and Denis Rebbeck. *Welding,* v. 15, Sept. 1947, p. 429-440.

Arrangement, procedures, and equipment used in fabrication of welded ships.

22-544. How Scientific Welding Can Assist the Paper Mill Engineer. C. W. Brett. *Paper Making and Paper Selling,* Summer 1947, p. 38-39.

Uses of welding repair.

22-545. How to Weld Lead Pipe. L. S. Bowser. *Heating, Piping & Air Conditioning,* v. 19, Sept. 1947, p. 91-92.

Practical information on welding lead pipe for industrial systems.

22-546. Methods of Joining Pipe: Screwed Joints for Ferrous and Brass Pipe. J. E. York. *Heating and Ventilating,* v. 44, Sept. 1947, p. 76-82.

First of a series containing engineering data on the various methods employed for joining ferrous and nonferrous pipe.

22-547. Welding by the Inert-Arc Process. R. W. Tuthill and W. J. Campbell. *Heating and Ventilating,* v. 44, Sept. 1947, p. 83-86.

Application to the rapid welding of stainless alloys, copper alloys, and aluminum.

22-548. Spattering of Fused Metal During Welding With Coated Electrodes. A. A. Erokhin. *Avtogennoe Delo (Welding),* no. 5, 1947, p. 1-7. (In Russian.)

Investigated theoretically and experimentally, it was found that this phenomenon is induced by the presence of hydrogen in the weld metal. Conditions for the occurrence of spattering and its mechanism. 20 ref.

22-549. Current Irregularities in Contact-Welding Machines. A. E. Blitshtein. *Avtogennoe Delo (Welding),* no. 5, 1947, p. 7-10. (In Russian.)

Theoretical and experimental investigation indicates that the character of the primary and the secondary current at the moment of contact may be quite different in spot, seam, or butt welding. Current variations.

22-550. Hard Welding of High-Chromium Steels. T. N. Dubova and F. I. Rasdui. *Avtogennoe Delo (Welding),* no. 5, 1947, p. 11-14. (In Russian.)

Investigation included welding conditions, electrode compositions, chemical analysis of weld metal and mechanical strength and hardness of the welds. It was found that 1 to 2% graphite in the coating results in a weld material of high mechanical strength and hardness.

22-551. Automatic Welding of a Gas Tank of Large Dimensions. E. K. Alekseev. *Avtogennoe Delo (Welding),* no. 5, 1947, p. 20-22. (In Russian.)

Metnod used

22-552. Welding of Spherical Regeneration Tanks 12.98 M. in Diameter. E. D. Lonskii. *Avtogennoe Delo (Welding),* no. 5, 1947, p. 23-26. (In Russian.)

Second part of article begun in the no. 2 issue for 1947.

22-553 Spot and Resistance Welding of 18-8 Stainless Steel. D. S. Balkovets. *Avtogennoe Delo (Welding),* no 5, 1947, p. 27-29. (In Russian.)

Data in tabular form for 18-8 of different sizes and shapes.

22-554. A New Type of Torch for Gasoline Welding. S. V. Begun. *Avtogennoe Delo (Welding),* no. 5, 1947, p. 29. (In Russian.)

With controllable preheating of liquid fuel, experimental results showed applicability of such torches in welding of different light metals and alloys.

22-555. Gas Welding Equipment Required in Steel Construction. G. S. Dubinskii. *Avtogennoe Delo (Welding),* no. 5, 1947, p. 30-31. (In Russian.)

Equipment recommended by the author.

22-556. The Control of Automatic Welding Under Flux. I. L. Brinberg. *Avtogennoe Delo (Welding),* June 1947, p. 1-8. (In Russian.)

Factors influencing the process. Methods of control for each individual type of weld.

22-557. Automatic Welding of Small Bolts or Pins. N. G. Ostapenki, Iu. A Sterenbogen and D. A. Dudko. *Avtogennoe Delo (Welding),* June 1947, p. 12-15. (In Russian.)

A newly developed, manually operated welding gun weighing about 5 lb. will handle bolts and pins up to 12 mm. in diameter and 80 mm. in length.

22-558. Distribution of Stress in Welded Joints. M. F. Sichikov and Z. D. Vishnevetskii. *Avtogennoe Delo (Welding),* June 1947, p. 15-18. (In Russian.)

Use of plastic models for determination of stress distribution, and the photoelastic method to reveal the stress patterns.

22-559. Automatic Welding of Cromansil Steel Under Flux. Ia. A. Zav'ialov. *Avtogennoe Delo (Welding),* June 1947, p. 19-21. (In Russian.)

The welding of Cromansil steel (0.99% Mn, 0.93% Si, 0.74% Cr, 0.35% C, 0.23% Mo, 0.020% P, and 0.012% S), which is widely used in structural work, using different welding rods. Satisfactory results were obtained with rods of 20MA steel (composition given) and AH-1 or O.C.Ts.-45 fluxes (composition not given).

22-560. Copper-Cadmium Alloy for Electrodes Used in Spot Welding Machines. V. A. Ivanov, A. V. Shadrin, and P. I. Shorin. *Avtogennoe Delo (Welding),* June 1947, p. 21-25. (In Russian.)

A series of Cu-Cd alloys was investigated in a search for more durable welding electrodes. The alpha solid solution (1 to 1.5% Cd) was found most satisfactory. Method of production and test results.

22-561. Shearing of Rivets by Means of an Oxy-Acetylene Torch. S. G. Gusov. *Avtogennoe Delo (Welding),* June 1947, p. 25-26. (In Russian.)

Design and technique of use for torch developed for cutting off rivets.

22-562. Developments in the Welding of Armor. T. L. H. Butterfield. *Welder,* v. 16, April-June 1947, p. 26-32.

Early attempts to weld light armor with ferritic electrodes; advantages of austenitic electrodes; hydrogen theory for the mechanism of cold cracking; welding of light armor steels with austenitic electrodes; effects of carbon content, hardenability, and heat treatment on weldability; welding of heavy armor; use of large-gage electrodes; hot cracking of austenitic weld metal; and future possibilities for development.

22-563. The Fabrication of Framed Structures in High Tensile Structural Steel by Welding. (Continued.) R. Digby Smith. *Welder,* v. 16, April-June 1947, p. 33-35.

Selective-testing and dimensional-checking procedures used at central testing stations in Britain during the war.

22-564. Stud Welding. H. Martin. *Welder,* v. 16, April-June 1947, p. 36-39.

Welding of bolts of ferrous and nonferrous materials to sheet metal by the Cyc-Arc process.

22-565. Spotlight on Arc Welding. Part II. *Welder,* v. 16, April-June 1947, p. 40-42.

Miscellaneous applications.

22-566. Electric Arc Welding in H. M. Dockyard. Part III. *Welder,* v. 16, April-June 1947, p. 43-46.

Welding shop at Devonport. Personnel problems. Welding on carrier *Terrible.*

22-567. Electric Furnace Brazing Solves a Problem. Stephen Porter Lathrop. *Materials & Methods,* v. 26, Sept. 1947, p. 110.

Welding four small stainless-steel tubes into a stainless piece which in turn is inserted in a brass outer shell. Using the torch method, one weld would melt while another was being made.

22-568. Shop Using Heliarc Welding With Four Other Processes. *Sheet Metal Worker,* v. 38, Sept. 1947, p. 55-57.

Use of d.c.-arc, a.c.-arc, oxy-acetylene, and planograph-torch welding, as well as Heliarc welding, which is preferred in most cases, in welding miscellaneous sheet-metal products.

22-569. Lead Welding Practices. *Sheet Metal Worker,* v. 38, Sept. 1947, p. 58-61, 106. (Reprinted from *Linde Tips.)*

22-570. High Frequency Vibrations in the Soldering of Aluminum. *Machinery Lloyd (Overseas Edition),* v. 19, Sept 13, 1947, p. 83.

Results of investigation by National Research Council, Ottawa, Canada. High-frequency sound was successfully used to remove oxide films from the product to be coated. It was found that strips of aluminum could readily be coated by dipping them into a melt vibrating at 4000 cycles per sec. Use of a vibrating soldering iron.

22-571. The Deposition of Hard Facing Alloys. *Machinery Lloyd (Overseas Edition),* v. 19, Sept. 13, 1947, p. 84-85.

Importance of the correct electrode and the part played by the parent metal.

22-572. Welding Hardenable Steels. Orville T. Barnett. *Steel,* v. 121, Sept. 22, 1947, p. 72-74, 110; Sept. 29, 1947, p. 80-84, 114, 117.

The Lehigh system for analyzing weldability of hardenable steels. Use of S-curves for learning the mechanics of steel transformations; relation of martensite formation to preheat, interpass temperature and postheat treatments; and use of lime-ferritic low-hydrogen electrodes.

22-573. How to Increase Flexibility of Automatic Arc Welding. *Steel,* v. 121, Sept. 29, 1947, p. 112.

How a skilled welder can switch without difficulty from job to job having different fitups and different joint preparation, using the new welding positioner.

22-574. Laying the Biggest Inch Pipe Line. *Welding Engineer,* v. 32, Oct. 1947, p. 42-43.

Equipment and procedures, especially for welding the sections together.

22-575. Spot Welded Display Signs *Welding Engineer,* v. 32, Oct. 1947, p. 59

Change-over to resistance welding has cut considerable time and labor from the production of large sheet-metal signs for display advertising.

22-576. Flux-Injection Cutting. Part II. G. E. Bellew. *Welding Engineer,* v. 32, Oct. 1947, p. 60-62.

New process makes it possible to flame-cut stainless steels on a production basis by injecting powdered flux via the cutting-oxygen stream. Applications.

22-577. Causes and Cures for Hot Welding Cables. R. L. Townsend. *Welding Engineer,* v. 32, Oct. 1947, p. 70-71.

How and what to check to discover causes, and what to do to correct the trouble.

22-578. Welding in the Iron Foundry. H. E. Schultz. *Foundry,* v. 75, Oct. 1947, p. 78-80, 136, 139.

Welding procedures applicable to iron foundry work and some of the factors necessary to insure a successful repair-welding program.

22-579. Ship Welding Research. *Engineer,* v. 184, Sept. 19, 1947, p. 277-278.

Recent British work and future plans.

22-580. Award to General Electric Co. for an Alternating Current Inert-Atmosphere Arc Welder for Aluminum. *Electrical Manufacturing,* v. 40, Oct. 1947, p. 134-139, 250, 252.

Illustrated and described.

22-581. Cutting Corrosion-Resistant Alloys by the Flux-Injection Method. *Machinery,* v. 54, Oct. 1947, p. 165-166.

Fabrication of stainless steels by a combination of flame-cutting and welding by above method in which a special dry nonmetallic flux is carried directly by the oxygen stream to cope with the refractory oxides formed by the alloy elements.

22-582. Powder Process Simplifies Stainless Steel Cutting. *Production Engineering & Management,* v. 20, Oct. 1947, p 59-60.

Linde processes for oxy-acetylene cutting of stainless or chromium steels.

22-583. Temperature Chart for Soldering, Brazing and Welding Processes. Richard C. Hitchcock. *Product Engineering,* v. 18, Oct. 1947, p. 171.

22-584. Pressure Welding. A. L. Burns, Jr *World Oil,* v. 127, Oct. 1947, p. 92, 94, 96, 98.

Machine produces pressure welds in line pipe. How high-grade welds are assured.

22-585. Water Tank Seams Welded in Continuous Mill. *Iron Age,* v. 160, Oct. 9, 1947, p. 67.

Tells how production of 14-gage water-softener tanks has been stepped up to 180 units per hr. by use of a welding mill using the Linde Unionmelt process.

22-586. Nonmagnetic Arc Welding Joints Between Mild Steel Plates. O. C. Frederick. *Steel,* v. 121, Oct. 13, 1947, p. 85, 124.

Use of nonmagnetic materials is often required in the manufacture of switch gear and other electric equipment to break up magnetic circuits Use of an arc-welded seam of nonmagnetic composition makes possible the elimination of special steels or nonferrous metals and simplifies welding of component parts. Gives results of an investigation to determine minimum root spacing in groove design required for producing a nonmagnetic arc-welded band between mild-steel plates, when using stainless-steel and aluminum-bronze electrode filler metals. Results indicate that thickness of plate material has little bearing on groove width. Type of electrode, diameter of electrode, welding current, and welding technique are the prime factors.

22-587. Reactions of Silicon and Manganese During Automatic Welding of Low-Carbon Steel Using Fluxes. K. V. Liubavskii. *Avtogennoe Delo (Welding),* July 1947, p. 1-10. (In Russian.)

Results of an extensive theoretical and experimental investigation of the reactions. It is shown that the reactions may proceed either very slowly or vigorously depending on whether the concentrations of Si and Mn are close to or far from equilibrium. The welding process was investigated under both passive and active conditions. The formation of silicate inclusions and the mechanical properties of the weld metal were also investigated. 16 ref

22-588. Welding Electrodes "E-55-Zh" M. G. Popov. *Avtogennoe Delo (Welding),* July 1947, p. 10-13. (In Russian.)

Results of an investigation of the effect of welding variables on the properties of the weld metal produced by use of the above electrodes (composition given) for the welding of steel containing 24% Cr and 12% Ni.

22-589. Concerning an Investigation of the Strength of Spot Welded Joints. G. P. Mikhailov and A. A. Laptev. *Avtogennoe Delo (Welding),* July 1947, p. 13-14. (In Russian.)

Results of theoretical calculation and experimental investigation of the stress distribution among spot welds with different distances between the

spots and in different thicknesses of plate.

22-590. Gasoline-Oxygen Cutting of Steel Under Water. V. M. Agapov. *Avtogennoe Delo (Welding),* July 1947, p. 16-19. (In Russian.)
Two types of torches for use with the above—one with electrical vaporization, the other with mechanical spraying of the gasoline. Results of a laboratory investigation of the process.

22-591. Submerged Welding With an Enclosed Arc. K. V. Vasil'ev and M. S. Kaufman. *Avtogennoe Delo (Welding),* July 1947, p. 19-21. (In Russian.)
Technique using pieces of wood with grooves in them to cover up the electrode, thus providing a channel for the escaping gases which thus keep the water from extinguishing the arc. Electrode composition; welding current; rate of welding; chemical analysis of base metal, electrode metal, and weld metal; and weld strength.

22-592. Arc Welding of "Mark EI-257" Steel Pipe. A. N. Pogromskii. *Avtogennoe Delo (Welding),* July 1947, p. 21-24. (In Russian.)
The steel used and its composition; the experimental methods used; establishment of optimum welding conditions; determination of mechanical properties of the welds; and influence of heat treatment schedules on the quality of the welds.

22-593. Welding and Joining of Cutting Tools With Spot Welding Machines. K P. Imshennik. *Avtogennoe Delo (Welding),* July 1947, p. 24-26. (In Russian.)
The electrode and fittings for the above and other information concerning recommended procedures for joining hard-alloy tools to other metals used as holder or support.

22-594. Experiment on Welding of T-Shaped Beams. V. A. Verkholantsev. *Avtogennoe Delo (Welding),* July 1947 p 26. (In Russian.)
Difficulty was experienced with working during the welding of the two T-shaped beams. How the trouble was remedied by proper weld design.

22-595. Cold Welding of Cast Iron. N A. Rybchinskii. *Avtogennoe Delo (Welding),* July 1947, p. 28. (In Russian.)
Improved repair-welding technique and composition of the electrode coating for steel.

22-596. Production of High Quality Flash Butt Welds. J. S. Blair. *Transactions of the Institute of Welding,* v 10, Aug. 1947, p. 107-117.
To obtain the best work in this form of welding, it is necessary to establish by experimental work, the requisite technique and then to make every weld under precisely the same conditions, aided where necessary by special check apparatus operating at each weld. An occasional routine test to destruction is also recommended.

22-597. Ship Welding as Practiced on the Tyne. Norman M. Hunter and J. P. Wadling. *Transactions of the Institute of Welding,* v. 10, Aug. 1947, p. 118-120.
Application of the process to large tanker construction. Large folding drawings.

22-598. Welding in Marine Engineering. J. A. Dorrat. *Transactions of the Institute of Welding,* v. 10, Aug. 1947, p. 121-125.
Modern methods and trends.

22-599. Arc Welded Structural Steelwork. Built-Up Girders and Compression Members. *Transactions of the Institute of Welding (B.W.R.A. Supplement),* v 10, Aug. 1947, p. 2-5, 20.
Recommendations of the FE.13 Committee for the design and fabrication of welded members.

22-600. Electrode Selection for Hard Facing. *Metallurgia,* v. 36, Sept. 1947, p 278-279.
Condensed from "Hard Facing With Murex", Welding Processes, Ltd., Waltham Cross, Herts., England.

22-601. Welding Metallurgy. J. G. Ball. *Metal Industry,* v. 71, Sept. 12, 1947, p 219-222, 227; Oct. 10, 1947, p. 299-301.
Recent progress in the nonferrous alloy field. Numerous tables, charts, and photomicrographs from the publications reviewed. (To be continued.)

22-602. Electric Welding and Upsetting Operations on Tractor Parts. *Machinery (London),* v. 71, Sept. 25, 1947, p. 339-343.
Methods used by Standard Motor Co., Ltd.

22-603. Spot Welding Principles and Practice. I. S. Morton. *Machinery Lloyd (Overseas Edition),* v. 19, Sept. 27, 1947, p. 68-75.
Fundamentals, materials suitable for spot welding, and modern spot welding equipment.

22-604. Flash Welding Theory and Practice. W. H. Cochran. *Iron Age,* v. 160, Oct. 16, 1947, p. 150-154.
The principle on which this method of welding operates and the technique of its application to materials of various kinds and thicknesses.

22-605. Assembling Turntables With Battery Powered Welders. *Iron Age,* v. 160, Oct. 23 1947, p. 42.
Assembly of phonograph turntables by Precision Mfg. Co., Bergholz, Ohio.

22-606. Arc Weld Fabrication of Ball Mills. J. F. Cunningham, Jr. *Iron Age,* v. 160, Oct. 23, 1947, p. 43.
Ability to combine wear resistant

steel with mild steel, economy in weight and cost, prompted selection of this welding process. Procedures followed.

22-607. **Uniting Wood and Metal: Plymetl.** *Modern Metals,* v. 3, Oct. 1947, p. 42.

Properties and applications of "Plymetl". Light-metal sheets are bonded to both sides of plywood panels by a special undisclosed bonding agent.

22-608. **Welding Applications in Ore Bridges.** George F. Wolfe. *Iron and Steel Engineer,* v. 24, Oct. 1947, p. 84-85.

Construction, for the first time, of an ore bridge with all components welded except the main truss and cantilever spans.

22-609. **Unique Canadian Contributions to Oxygen Cutting.** R. A. Dunn. *Canadian Metals & Metallurgical Industries,* v. 10, Oct. 1947, p. 16-19.

Several new techniques developed in Canada during the war for specific purposes in mass production.

22-610. **The Spot Welding of Dissimilar Aluminum Alloys in the 0.040-In. Thickness.** W. F. Hess, R. A. Wyant, and F. J. Winsor. *National Advisory Committee for Aeronautics Technical Note No. 1322,* Oct. 1947, 37 p.

Reports on research being conducted at Rensselaer Polytechnic Institute, covering eight combinations. In many instances the chemical treatment of dissimilar alloys prior to spot welding is a less difficult problem than the treatment of some similar alloy combinations.

22-611. **The Flash Welding of Hard Drawn High-Carbon Steel Wire.** R. W. Bennett and R. D. Williams. *Mines Magazine,* v. 37, Oct. 1947, p. 12-20.

Reprinted from *Welding Journal,* Oct. 1946.

22-612. **Welding of Boilers and Tenders.** *Railway Mechanical Engineer,* v. 121, Oct. 1947, p. 569-572.

Applications of welding and cutting in the boiler shop for the fabrication of new parts and the removal of old ones. (Presented at Meeting of Master Boiler Makers' Association, Chicago, Sept. 15-18, 1947.)

22-613. **Argon-Shielded Metal-Arc Welding of Aluminum.** Gilbert C. Close. *Light Metal Age,* v. 5, Oct. 1947, p. 6-9.

Development for edge welding of the reinforcement strap over the butt welds holding the various sections of liquid oxygen tanks together, a problem that defied solution by conventional gas or arc welding methods.

22-614. **Arc Welding in Furnace Making.** *Sheet Metal Worker,* v. 38, Oct. 1947, p. 90.

Procedures in plant of Waterman-Waterbury Co., Minneapolis.

22-615. **Refrigerator Evaporators Brazed in Automatically Controlled Furnaces.** *Industrial Heating,* v. 14, Oct. 1947, p 1594, 1596, 1598.

22-616. **Welding Railroad Passenger Cars. Part I.** Arthur M. Unger. *Welding Engineer,* v. 32, Oct. 1947, p. 44-48.

Some of the novel and ingenious welding techniques developed for the underframe and side frames of passenger cars. Submerged-melt welding is extensively used. (To be continued.)

22-617. **Brazing Three-Piece Assembly With Induction Heating Unit.** *Machinery,* v. 54, Oct. 1947, p. 168.

Method used to join three assembled parts of a lawn mower—the spider, drive-shaft, and bearing retainer.

22-618. **A Brief Review of Brazing Processes.** H. R. Brooker. *Sheet Metal Industries,* v. 24, Oct. 1947, p. 2041-2045.

History; brazing materials; requirements of fluxes; types of flux; flux application; and joint design and performance. (To be continued. Presented at Autumn Conference of Sheet and Strip Metal Users' Technical Assoc.)

22-619. **Factors Affecting the Choice of Metal Joining Processes.** J. L. Miller. *Sheet Metal Industries,* v. 24, Oct. 1947, p. 2051-2057, 2061.

Advantages and limitations of the various joining methods: soft soldering; riveting; copper brazing; silver soldering; different types of welding.

22-620. **The Welding of Nonferrous Metals. Part VIII. The Welding of Copper and Its Alloys. (Concluded.)** E. G. West. *Sheet Metal Industries,* v. 24, Oct. 1947, p. 2058-2061.

Copper-nickel alloys and other copper-rich alloys. (To be continued.)

22-621. **The British Welding Research Assoc.'s Symposium on the Welding of Light Alloys. Aluminum Alloys for Gas Welding With Special Reference to Aluminum-Silicon-Copper Alloys.** J. Pendleton and E. A. G. Liddiard. *Sheet Metal Industries,* v. 24, Oct. 1947, p. 2062-2066, 2068.

The welding behavior of aluminum alloys containing from 2½ to 5% Cu plus 5 to 10% Si and the impurities normally associated with either commercial-purity aluminum or secondary aluminum alloys was compared with the welding behavior of other aluminum alloys. Mechanical properties and heat treatment of the aluminum-5% Si-2½% Cu alloy in the wrought and cast conditions.

22-622. **Bonding Sapphire to Metal.** T. C. Du Mond. *Materials & Methods,* v. 26, Oct. 1947, p. 84-86.

Sapphire can be soldered or brazed to metal parts by a new bonding process which promises to extend the use-

fulness of this material in such products as gages, hand tools and cutting tools.

22-623. Welding and Flame Cutting Applied to Stainless and Clad Steels. S. F. Danes. *Materials & Methods,* v. 26, Oct. 1947, p. 102-106.

Use of above in fabrication of a "Hydrapulper" (a unit 12 ft. in diameter and nearly 8 ft. high). The fundamental design is not new, but the fabrication methods are.

22-624. Where and How to Use Controlled Hydrogen Electrodes. Orville T. Barnett. *Industry and Welding,* v. 20, Oct. 1947, p. 26-29, 74-77.

How and why E6015 electrodes operate and the technique for using them.

22-625. Heliarc Welding Magnesium, Stainless, Aluminum at Northrup. H. C. Eubank and T. E. Piper. *Industry and Welding,* v. 20, Oct. 1947, p. 30-32, 34, 78.

Some of the "know-how" of the above accumulated as a result of experience in the fabrication of aircraft.

22-626. Stop Those Welding and Cutting Fires. G. R. Webster. *Industry and Welding,* v 20, Oct. 1947, p. 38-39, 44, 46, 90-92.

Recommended safety precautions.

22-627. Resistance Welding Review. C. M. Manzer. *Industry and Welding,* v. 20, Oct. 1947, p. 79-81.

One year's progress.

22-628. White Metal Welding. *Linde Tips,* v. 26, Oct. 1947, p. 109-112.

Hints for successful repair of die castings.

22-629. Shape-Cutting Setup. *Linde Tips,* v. 26, Oct. 1947, p. 114.

How to make a small shape-cutting machine where accuracy requirements are not too exacting.

22-630. Portable Shop Table. *Linde Tips,* v. 26, Oct. 1947, p. 118.

Welding and cutting table.

22-631. Practical Kinks on How to Make It. *Linde Tips,* v. 26, Oct. 1947, p. 119.

Cylinder stand; anvil base; spark arrester; key drift; work support; welding light tubing.

22-632. Let Contraction Do the Heavy Work. *Linde Tips,* v. 26, Oct. 1947, p. 124-125.

How to remove distortion which took place during welding, by proper use of the oxy-acetylene flame.

22-633. Storage Battery Work. *Linde Tips,* v. 26, Oct. 1947, p. 129-130.

Maintenance and repair by lead welding.

22-634. Problems in Resistance Welding Stainless Steel Railway Car Structures. J. H. Van den Beem. *Welding Journal,* v. 26, Oct. 1947, p. 837-843.

Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.

22-635. Shunt Circuit Impedance in Spot Welding 1/8, 1/4 and 1/2-In. Mild Steel. Robert H. Blair. *Welding Journal,* v. 26, Oct. 1947, p. 843-848.

In spot welding parts where more than a single weld is used, it is known that contiguous welds frequently do not have the same shear strength as the initial welds. This is due to the fact that the initial weld provides a shunt current path around the contiguous weld. Results of an experimental investigation of this phenomenon. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-636. Integral Bosses for Pressure Vessels. H. L. Anthony and H. P. Schane. *Welding Journal,* v. 26, Oct. 1947, p. 849-859.

Photographic, photomicrographic, and other data demonstrate the advantages of integral bosses (threaded openings, studs and other parts simultaneously cast and welded into position) for thin-wall pressure vessels such as hot water boilers. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-637 Engineering Symposium of Future Control of Resistance Welding Machine. C. E. Smith. *Welding Journal,* v. 26, Oct. 1947, p. 860-866.

Present status and future trends. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-638. Development of Butt Welded Joints in Pressure Vessels. Edwin J. Brown. *Welding Journal,* v. 26, Oct. 1947, p. 867-871.

Step-by-step development of an improved procedure which has proven satisfactory in operation. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-639. Some Unusual Features Encountered in Investigating Cracked Welds in 35-15 Magnesium Retorts. H. J. Nichols. *Welding Journal,* v. 26, Oct. 1947, p. 881-884.

The methods used were statistical examination of data, metallographic examination of cracked welds, and temperature measurements of the retort in service. It was determined that the cracking of welds was due to higher than usual rigidity of retorts at the service temperature (resulting from increased carbon content), location of welds within a carbide-precipi-

tation temperature zone, and loads on the retorts causing plastic strain and deformation of the weld metal. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-640. **Directional Welding to Minimize or Eliminate Distortion in Weldments and Control Residual Stresses.** Joseph Holt. *Welding Journal,* v. 26, Oct. 1947, p. 885-888.

Proper welding sequences and examples of their application. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-641. **The Theory of Oxy-Arc Cutting.** Hallock C. Campbell. *Welding Journal,* v. 26, Oct. 1947, p. 889-903.

Method and theory covering terminology, functions of the core, functions of the coating, rate of burn-off of the rod, rate of cutting mild steel, rate of oxygen consumption, application to stainless steels and oxidation-resistant alloys, economics of the operation, and future research requirements. 15 ref. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-642. **Composite Alloy Fabrication With the Hidden Arc.** H. E. Cable. *Welding Journal,* v. 26, Oct. 1947, p. 903-906.

Applications and advantages for surfacing or joining pieces of dissimilar composition. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-643. **Arc Welding of Copper and Copper-Base Alloys.** F. E. Garriott. *Welding Journal,* v. 26, Oct. 1947, p. 907-915.

Welding of the following most commonly used groups: copper; Cu-Sn alloys; Cu-Si alloys; Cu-Zn alloys; and Cu-Al-Fe alloys. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-644. **The Maintenance Weldery.** Cleo E. Hook. *Welding Journal,* v. 26, Oct. 1947, p. 915-917.

Author's conception of an ideal maintenance-welding shop. Organizational, equipment, and accounting setups. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-645. **Distribution of Strength and Ductility in Welded Steel Plate as Revealed by the Static Notch Bar Tensile Test.** W. F. Brown, Jr., L. J. Ebert, and G. Sachs. *Welding Journal,* v. 26, Oct. 1947, p. 545s-554s.

Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.

22-646. **Effects of Section Size on the Static Notch Bar Tensile Properties of Mild Steel Plate.** W. F. Brown, Jr., J. D. Lubahn, and L. J. Ebert. *Welding Journal,* v. 26, Oct. 1947, p. 554s-559s.

Effects on properties of a fully silicon-killed 0.25% carbon steel plate were investigated for geometrically similar notched bars tested in static tension. Results revealed a considerable decrease in notch strength from 110,000 psi. for the smallest specimen to 88,000 psi. for the largest specimen. The corresponding decrease in notch ductility was from 20% to only 2%. Data are compared with those reported previously by other investigators for steel, and possible explanations for the size effects discussed. 17 ref. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-647. **Some Metallurgical Aspects of Carbon Steel Spot Welding.** J. Heuschkel. *Welding Journal,* v. 26, Oct. 1947, p 560s-582s.

Physical tests were made upon heat treated and untreated spot welded specimens to ascertain the influence of carbon content, thickness, and initial properties upon the tension-shear and direct-tension strengths of spot welds in carbon steels up to ½ in. in thickness and up to 1.09% in carbon content. Quench rates were studied indirectly from hardness and metallographic data. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-648. **The Fundamentals of Spot Welding Steel Plate.** W. F. Hess, W. D. Doty and W. J. Childs. *Welding Journal,* v. 26, Oct. 1947, p. 583s-593s.

Different welding variables were studied and from the results it was found possible to establish a general procedure for selection of optimum welding conditions for various thicknesses and types of materials. Development of control equipment, measuring techniques, and methods for testing the spot welds. Continuous welding is shown to be superior to pulsation welding, and dome-shaped electrode contacting surfaces were found to result in the best welds. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-649. **Static-Strength Tests of Fillet Welds on Aluminum Alloy 61S-T Plate.** R. L. Moore. *Welding Journal,* v. 26, Oct. 1947, p. 593s-600s.

Metal-arc welds in nominal sizes of ¼, ⅜, ½ and ¾ in. were investigated and a few samples of ½-in. argon-shielded tungsten-arc welds were included. Tests were made on specimens in the as-welded and reheat treated and aged conditions. The specimens

were all of symmetrical, double butt-strap type, made of plates ranging from ⅜ to 1 in. in thickness. Lengths of individual welds ranged from 1½ to 6 in. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-650. **Selection of Austenitic Electrodes for Welding Dissimilar Metals.** Anton L. Schaeffler. *Welding Journal*, v 26, Oct. 1947, p. 601s-620s.

The relation existing between the various compositions of electrodes and the relation of electrode to base metal revealed by using the Maurer microstructure diagram. A modified Newell-Fleischman equation is used to convert the austenite and ferrite-promoting minor elements into either chromium or nickel equivalents so that the alloy can be located on the chromium-nickel diagram. A method of predicting resultant weld-metal properties, when welding dissimilar metals, utilizes an innovation called "dilution direction lines". A method of using dilution direction lines for electrode specification to obtain definite structures in the weld metal. 17 ref. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-651. **Semiautomatic Welding With Standard Manual Arc Welding Equipment.** F. W. Myers, Jr. *Welding Journal*, v. 26, Oct. 1947, p. 626s-640s.

A process developed in Germany during the war, which is known as the copper-bar or Elin-Hafergut procedure. In this process, the electrode lies on the seam of a butt or fillet weld and is covered with a copper bar provided with a groove that encloses and shields the electrode. This results in a finished weld having an appearance which is usually very good. Paper is placed between the electrode and the work to help prevent movement of the electrode, to serve as insulation, and to absorb oxygen as it burns. Results of an extensive investigation of the process at Watertown Arsenal Lab. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 1947.)

22-652. **Mechanized Welding and Cutting Employed in Fabricating Heavy-Duty Earth Movers.** Earl Griffeth. *Steel*, v. 121, Oct. 27, 1947, p. 80-84, 111, 114.

Equipment and procedures used by Wooldridge Mfg. Co., Sunnyvale, Calif. (Presented at Western Metal Congress, Oakland, Calif., March 26, 1947.)

22-653. **Electrons Guide the Cutting Torch.** T. H. Ayling. *Scientific American*, v. 177, Nov. 1947, p. 213-215.

How a photo-electric tracer, reading directly from an inexpensive drawing, controls the oxy-acetylene torch to cut from any pattern.

22-654. **Cylinder Head Welding.** T. B. Jefferson. *Welding Engineer*, v. 32, Nov. 1947, p. 33-35.

Repair-welding shop of Twin Cities Welding and Parts Co., Omaha.

22-655. **Welding Railroad Passenger Cars. Part II.** Arthur M. Unger. *Welding Engineer*, v. 32, Nov. 1947, p. 36-39, 43.

Fabrication of sides, ends, and roof at Pullman-Standard.

22-656. **Mechanized Production Boosts Scraper Output.** Earl Griffeth. *Welding Engineer*, v. 32, Nov. 1947, p. 44-48.

Mechanized welding and cutting in manufacture of heavy-duty earth scraper.

22-657. **All-Welded Grain Loader.** *Welding Engineer*, v. 32, Nov. 1947, p. 51.

Fabrication of screw conveyers and other steps in production of above at Snow Corp., Omaha.

22-658. **Gas-Shielded Arc Processes.** L. G. Pickhaver. *Welding Engineer*, v. 32, Nov. 1947, p. 52-55, 58.

Advantages and disadvantages of atomic-hydrogen, helium, and argon welding.

22-659. **Welding Takes Gas Storage Underground.** John H. Giroux. *Welding Engineer*, v. 32, Nov. 1947, p. 56-58.

Joining of individual sections for natural gas storage.

22-660. **Arc-Welding Cable Data.** *Welding Engineer*, v. 32, Nov. 1947, p. 67.

Data for arc welding electrode and ground cables and for portable cables between arc welder and power source.

22-661. **Carbon Brazes Copper Parts.** W. Scott. *American Machinist*, v. 91, Nov. 6, 1947, p. 98-100.

Use of carbon blocks to hold the parts to be brazed in intimate contact during heating and cooling and also to supply heat because of the resistance of carbon to the passage of electricity.

22-662. **Furnace Brazing.** H. D. Hendrick. *Automobile Engineer*, v. 37, Oct. 1947, p. 365-371.

A detailed review of production equipment and methods.

22-663. **Spot Welded Aluminum Lap Joints Designed for Repeated Loads.** Robert C. McMaster and Horace J. Grover. *Product Engineering*, v. 18, Nov. 1947, p. 112-116.

A series of fatigue tests of spot welded lap joints to determine the influence of spot size, sheet thickness, and spot pattern on fatigue strength. Typical radiographs. (Results of wartime research at Battelle Memorial Institute.)

22-664. Kolene Process Aids Silver Brazing of Cast Iron. E. Russell Atkinson. *Iron Age,* v. 160, Nov. 6, 1947, p. 85.

The Kolene process is a combined cleaning and surface preparation method that produces a pure ferrite surface, which is necessary in order to silver braze cast iron to steel. It is a catalyzed molten-salt bath, melting point 500° F., and operating range of 850 to 950° F., plus a sequence of oxidation and reduction cycles regulated according to size and shape of parts and surface desired. Application to silver brazing of a cast-iron cylinder to a steel stamping to withstand a 300 ft-lb. torque test, and an air test for leakage.

22-665. British Shipbuilding. Part III. The Wallsend Yard of Swan, Hunter, and Wigham Richardson, Ltd. *Welding,* v. 15, Oct. 1947, p. 452-459, 491.

Practice and equipment with special reference to building of oil tankers.

22-666. Atomic Hydrogen Welding; With Control of Carbon. *Welding,* v. 15, Oct. 1947, p. 460-464.

The Athyweld atomic-hydrogen welding process, which is claimed to give perfect carbon control, for the repair of worn tools and for building up new tools.

22-667. Heating and Ventilating Systems; Notes on Special Welding Technique. T. F. Mott. *Welding,* v. 15, Oct. 1947, p. 465-467, 497.

Practical aspects of pipe welding for heating and ventilating systems. Preparation and technique; repair and maintenance.

22-668. Oxygen Cutting; Deseaming and Gouging. (Continued.) E. Seymour Semper. *Welding,* v. 15, Oct. 1947, p. 468-472.

Modern practice in manual and machine cutting. (To be continued.)

22-669. Choose the Right Electrode. (Continued.) W. D. Waller. *Welding,* v. 15, Oct. 1947, p. 472-479.

The various types of electrode available. (To be concluded.)

22-670. Resistance Welding in Mass Production; Jigs and Tools for Projection Welding. (Continued.) A. J. Hipperson and T. Watson. *Welding,* v. 15, Oct. 1947, p. 480-491.

Design and arrangement of various jigs and tools. (To be continued.)

22-671. Fundamentals of Oxy-Acetylene Welding and Cutting. J. I. Banash. *Steel,* v. 121, Nov. 10, 1947, p. 110-112, 144, 146, 149.

Basic principles of processes; gases and equipment. Flame hardening, softening, priming, gouging, pressure welding, and steel conditioning.

22-672. Welded Flanges. G. A. Brewer. *Machine Design,* v. 19, Nov. 1947, p. 125-128.

Calculations and tests indicate no advantage of code-approved joint over simple butt weld.

22-673. Untersuchung von Elektrisch Geschweissten Konstruktions-elementen aus Aluminium-Legierungen. (Investigation of Electrically Welded Aluminum-Alloy Structural Materials.) L. Huguenin. *Schweizer Archiv,* v. 13, July 1947, p. 202-210.

Tests on airplane-engine housings. Values for the "O-alternating" tensile tests, using 12% Si electrodes, were equal to those obtained with Silumin cast construction.

22-674. Smit-Cyc Arc Bout-En Stiftlasapparaat. (Smit-Cyc Arc Butt and Spot Welding Apparatus.) *Smit Mededelingen,* v. 2, April-June 1947, p. 43-47.

Three models of butt welders for use on ⅛ x ½-in., ¼ x ⅝-in., and ¼ x ⅞-in. bars, respectively. Butt diameter, current consumption, and time. Tensile, bending, and compressive strength of the welded articles.

22-675. Het Vermogen Van Puntalsmachines. (The Capacity of Spot Welding Machines.) *Smit Mededelingen,* v. 2, April June 1947, p. 48-51.

Capacity of the model PT35 spot welder. Data for different load factors and current densities.

22-676. Automatic Brazing of Small Rotor Ends. *Electrical Manufacturing,* v. 40, Nov. 1947, p. 116, 118.

Motorized cycle with time control expedites this operation on small squirrel-cage rotors, using oxy-acetylene heating and water quench.

22-677. Applying Resistance Welding in Tank Production. *Machinery,* v. 54, Nov. 1947, p. 156-158.

Procedures and equipment used in manufacture of gasoline tanks by White Motor Co., Cleveland.

22-678. Le Découpage Electrique sous l'Eau. (Underwater Electric Arc Cutting.) R. Sarazin. *Soudure et Techniques Connexes,* v. 1, Jan-Feb. 1947, p. 7-15.

Methods used before, during, and after the war. Comparison of electric wire cutting in air and under water, and characteristics of underwater cutting are indicated. Work of French engineers on repair of damaged bridges as an example of the application of such methods.

22-679. Le Problème de la Soudabilité des Matériaux de Coque et l'Expérience de la Marine Francaise et des Constructions Soudées de la Marine de Commerce Américaine. (Problem of Weldability of Materials for Ship Hulls and the Experience of the French Navy vs.

the Welding of American Merchant Ships.) M. Dutilleul. *Soudure et Techniques Connexes,* v. 1, Jan-Feb. 1947, p. 16-24.

22-680. Contribution a l'Etude des Phénomenes de Dilatation et de Retrait. (Contribution to the Study of Phenomena of Expansion and Contraction.) P. Berthet. *Soudure et Techniques Connexes,* v. 1, Jan-Feb. 1947, p. 25-33.
Experimental data regarding longitudinal and transverse expansion and contraction in welded structures. The data concerning the former are not interpreted, but the latter type is thoroughly studied because of its greater effect upon practical work. Hopes that the concept of stabilized contraction which is presented will permit more thorough analysis of factors involved.

22-681. "UONI-13" Electrodes. K. V. Petran', N. M. Kizin, and A. P. Bibikov. *Avtogennoe Delo (Welding),* Aug. 1947, p. 4-9. (In Russian.)
Composition of the coating, properties of the deposited metal, and technology of the preparation of the above electrodes.

22-682. A Method of Estimating the Amount of Coating on an Electrode. A. A. Erokhin. *Avtogennoe Delo (Welding),* Aug. 1947, p. 10-13. (In Russian.)
A coefficient of the ratio of the weight of coating to the weight of the metal taking part in the process is proposed as a criterion for estimating the quantity of coating. This ratio is shown to be nearly constant for different sizes of electrodes having coatings of the same composition.

22-683. Differential Means of Determining Stresses. N. N. Prokhorov. *Avtogennoe Delo (Welding),* Aug. 1947, p. 20-22. (In Russian.)
Method proposed permits analyzing the stress state of the metal during the entire welding cycle.

22-684. Earthen Forms for Welding Fabrication Cutting Tools. Z. M. Ryzhik. *Avtogennoe Delo (Welding),* Aug. 1947, p. 27. (In Russian.)
Use of special forms in factory production of cutting tools with hard metal tips applied by fusion welding to the bodies of the tools.

22-685. Manipulator for Assembly and Welding of Crossbeams of Tension Frames. N. I. Kazakov. *Avtogennoe Delo (Welding),* Aug. 1947, p. 27-28. (In Russian.)
Technique of welding tension girders and construction of a handling tool to facilitate such operations.

22-686. On the Welding Deposition of Antifriction Alloys by Metallic Electrodes. L. P. Pankul. *Avtogennoe Delo (Welding),* Aug. 1947, p. 29. (In Russian.)
Process used for bronze surfacing of shafts and bushings by welding, especially as applied to locomotives.

22-687. Correction of the Power Factor of Welding Machines by Condensers. M. D. Genkin. *Engineers' Digest (American Edition),* v. 4, Oct. 1947, p. 486-489.
The low power factor of spot welding machines and the heavy intermittent current demands are difficult to meet on most distribution networks Use of static condensers in series rather than in parallel and fundamental calculations for such circuits. (Translated and condensed from *Bulletin de la Societe Francaise des Electriciens,* v. 6, Dec. 1946, p. 645-653.)

22-688. The Ellira Welding Process. W. Rädeker. *Engineers' Digest (American Edition),* v. 4, Oct. 1947, p. 475-478.
Data on process, which is known as the submerged arc or unionmelt process, both in the U. S. and in Great Britain. (Translated and condensed from *Stahl und Eisen,* v. 66-67, Jan. 30, 1947. p. 42-48.)

22-689. Heliarc and Argonarc Welding. R. Groves. *Machinery Lloyd (Overseas Edition),* v. 19, Oct. 25, 1947, p. 79-83.
Equipment, procedures, and applications.

22-690. Welding Metallurgy. Recent Progress in the Nonferrous Alloy Field. (Continued.) J. G. Gall. *Metal Industry,* v. 71, Oct. 17, 1947, p. 319-322; Oct. 24, 1947, p. 345-346, 348; Oct. 31, 1947, p 367-369.
Of magnesium alloys, and mechanical and structural properties of welds made of nonarsenical deoxidized copper containing various amounts of phosphorus. (To be continued.)

22-691. Methods of Joining Pipe—Welded and Brazed Pipe Joints. J. E. York. *Heating and Ventilating,* v. 44, Nov. 1947, p. 99-101.
Advantages and limitations of each. Common forms of welds and fittings.

22-692. Resistance Welding. R. T. Gillette. *Materials & Methods,* v. 26, Nov. 1947, p. 97-108.
Materials that can be resistance welded, resistance-welding equipment and control. 28 ref.

22-693. How to Maintain Spot Welders. Fritz Albrecht. *Factory Management and Maintenance,* v. 105, Nov. 1947, p. 84-88.
Weld-testing procedures and their use, not only for quality control but also to indicate necessity for maintenance work on welding machines.

22-694. **Welding for Coal Preparation.** Harold D. Larner. *Industry and Welding,* v. 20, Nov. 1947, p. 26-29, 74-75.

Cutting and welding operations in fabrication of coal-preparation equipment.

22-695. **Practical Applications of Toolsteel Welding.** Norman Anderson. *Industry and Welding,* v. 20, Nov. 1947, p. 30-32, 59-61.

Equipment, grinding, preheating, control of temperature, composite dies, and the welding of various types of toolsteel.

22-696. **Repair, Maintenance, Fabrication in the Plant Weldery. No. 14. The Dow Chemical Co., Midland, Mich.** *Industry and Welding,* v. 20, Nov. 1947, p. 40-42, 44, 46.

22-697. **Electric Welding.** *Railway Mechanical Engineer,* v. 121, Nov. 1947, p. 623-624.

Inert-gas shielding for arc welding, atomic-hydrogen welding, and automatic welding heads.

22-698. **Fabricating Hand Trucks by Welding.** Karl Stad. *Tool Engineer,* v. 19, Nov. 1947, p. 42.

How a production problem was solved by use of the right electrode.

22-699. **Jig and Fixture Economics; the Importance of Efficient Clamping.** B. R. Pyke. *Sheet Metal Industries,* v. 24, Nov. 1947, p. 2250, 2257.

Superiority of the toggle clamp over the old type plate clamp and its accessories in setting up for welding.

22-700. **A Brief Review of Brazing Processes. (Continued.)** H. R. Brooker. *Sheet Metal Industries,* v. 24, Nov. 1947, p. 2253-2256.

Design considerations; joint strength; preparation for brazing; and torch brazing. (To be continued. Presented at Autumn Conference of Sheet and Strip Metal Users' Technical Assoc.)

22-701. **The Welding of Nonferrous Metals. Part IX. (Continued.)** E. G. West. *Sheet Metal Industries,* v. 24, Nov. 1947, p. 2265-2271.

Weldability of different nickel-base materials and the different procedures used. (To be continued.)

22-702. **The British Welding Research Assoc.'s Symposium on the Welding of Light Alloys; Aluminum Alloys for Gas Welding With Special Reference to Aluminum-Silicon-Copper Alloys. (Continued.)** J. Pendleton and E. A. G. Liddiard. *Sheet Metal Industries,* v. 24, Nov. 1947, p. 2273-2278, 2280.

Discusses results presented in first installment. Welding behavior of the various alloys. Charts show hardness gradients across welds made in different ways and with different pretreatments and post-treatments. Mechanical properties and heat treatment of 5% Si, 2½% Cu, aluminum alloy in sand-cast and wrought conditions.

22-703. **Welding in the U. S. Aircraft Industry.** R. Grimaud. *Aircraft Engineering,* v. 19, Oct. 1947, p. 331-333; Nov. 1947, p. 361-365. (Translated from the French.)

A French production engineer's views on the position of welding in America.

22-704. **Flame Cut Stainless Steel (Arcos Oxyarc Process).** *Weld,* v. 3, Nov. 1947, p. 10-11

Examination of four samples of stainless plate and one of stainless bar indicates that the extent of carbide precipitation caused by the cutting operation will vary with the thickness of the material being cut and possibly with the technique employed by the operator.

22-705. **Intercrystalline and Other Types of Corrosion of Steam Boilers.** *American Railway Engineering Association Bulletin,* v. 49, Nov. 1947, p. 66-67.

Committee report indicates that all-welded construction should result in a satisfactory boiler, free of seams which facilitate concentrations of dissolved solids contributing to intercrystalline corrosion.

22-706. **Automatic Welders Increase Trailer Body Output—Cut Costs.** *Modern Industrial "Press",* v. 9, Nov. 1947, p. 6.

22-707. **Hydrogen Brazing Seals Evaporator Plates.** *Refrigerating Engineering,* v. 54, Nov. 1947, p. 443, 479.

Procedures and equipment used for joining two sheets, one of which is embossed to form channels for passage of refrigerant.

22-708. **New Lock Joint Speeds Assembly, Adds Rigidity.** *Sheet Metal Worker,* v. 38, Nov. 1947, p. 61.

New spring-construction lock joint recently developed in England permits better design and overcomes disadvantages of rigid assemblies using screws, rivets, or welded construction.

22-709. **Types of Modern Wire Welding Equipment. Part II.** *Wire Industry,* v. 14, Nov. 1947, p. 621-624.

Additional general purpose and specialized machines. (To be continued.)

22-710. **Mechanized Inert-Gas Shielded-Arc Welding.** H. T. Herbst. *Modern Metals,* v. 3, Nov. 1947, p. 28-32.

Adopted from paper presented at meeting of American Welding Society, Chicago, Oct. 1947.

22-711. Precision Pressure Regulation of Various Gases. J. K. Hamilton. *Welding Journal,* v. 26, Nov. 1947, p. 977-983.
The pressure-control phase of an oxy-fuel gas process; design of suitable equipment to meet these requirements. Some of the problems involved in pressure control for welding. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 19. 1947.)

22-712. On-the-Ground Welded Fabrication of Studding Speeds Construction of All-Steel Three-Story Office Building. R. H. Newton. *Welding Journal,* v. 26, Nov. 1947, p. 984.

22-713. Structural Dead Weight Eliminated in Construction of Four-Story, All-Welded Steel Building. E. D. Anderson. *Welding Journal,* v. 26, Nov. 1947, p. 985-987.

22-714. D. L. & W. 50-Ton Hopper Cars. W. C. Osha. *Welding Journal,* v. 26, Nov. 1947, p. 991-993.
Construction at American Car and Foundry Co.; welding procedures.

22-715. Pressure Welding Propeller Barrels. G. W. Motherwell, A. L. Rustay, S. M. Jablonski, and C. J. Burch. *Welding Journal,* v. 26, Nov. 1947, p. 994-1001.
Development of a satisfactory fabrication procedure for barrels of S.A.E. 4345 alloy steel. The experimental program consisted of three parts: pressure welding of S.A.E. 4345 steel and pressure welding of barrels; design of production equipment; establishment of procedures and controls for quality and quantity production.

22-716. Welding of Locomotive Type High Pressure Boilers. George M. Trefts, 3rd. *Welding Journal,* v. 26, Nov. 1947, p. 1011-1014.
Presented at 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.

22-717. New Developments in Railroad Maintenance-of-Way Work. C. A. Daley. *Welding Journal,* v. 26, Nov. 1947, p. 1015-1017.
Uses of the oxy-acetylene torch include: building up of wheel burns in rail; flame crowning or straightening of joint bars; flame hardening of openhearth steel frogs; flame shortening of eyebars to equalize stresses; butt welding of rails; flame cropping of rails; and flame cleaning of bridges and steel structures. (Presented at 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.)

22-718. The Heat Treatment of Spot Welds in Steel Plate. W. F. Hess, W. D. Doty, and W. J. Childs. *Welding Journal,* v. 26, Nov. 1947, p. 641s-652s.
Investigation shows that it is possible to perform in the welding machine all the common metallurgical heat treatments including grain refining, tempering, and austempering. Electronic equipment gives automatic control of the entire welding and heat treating sequence. It is also possible to follow and record the temperature of the weld during the process, permitting accurate establishment of the proper welding conditions.

22-719. Studies on the Effects of Red-Lead Paints on the Quality of Metal-Arc Welds in Structural Steel. R. W. Bennett, R. D. Williams, and C. B. Voldrich. *Welding Journal,* v. 26, Nov. 1947, p. 653s-663s.
Effects of red-lead paints on welding compared with those of zinc-chromate paints and unpainted steel. Operating characteristics of the electrodes, internal soundness of the weld metal, and mechanical tests were used as criteria for evaluating the relative effects. In general, satisfactory welds can be expected on steel with shop or field coats (nominal thickness of about 1 mil), of all the paints tested. (Presented at 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.)

22-720. The Flash Welding of Structural Aluminum Alloys. R. M. Curran and R. C. Becker. *Welding Journal,* v. 26, Nov. 1947, p. 664s-672s.
Two relatively new concepts have been introduced—first, the use of three-stage heat control during the welding cycle, and second, the use of much greater upset travel distances for aluminum alloys than is the practice in flash welding other materials. Need for an investigation of thermal cycles and temperature gradients associated with flash-welding. (Presented at 28th Annual Meeting, American Welding Society, Chicago, Oct. 19, 1947.)

22-721. Some Additional Tests on the Lehigh Restraint Specimen. R. D. Stout, S. S. Tor, L. J. McGeady, and G. E. Doan. *Welding Journal,* v. 26, Nov. 1947, p. 673s-682s.
A test specimen to determine the crack sensitivity of welds was used to investigate various factors such as: heats of high-tensile steel, effect of preheating low and high crack-sensitive steels; temperature at which root cracks form in the weld metal or heated zone of butt welds; and influence of electrode and welding conditions on contour and penetration of welds as related to cracking tendency.

22-722. Metallurgical Factors in the Embrittlement of Welded Plate. R. D. Stout and L. J. McGeady. *Welding Journal,* v. 26, Nov. 1947, p. 683s-692s.

Causes of impairment of notch resistance and ductility of structural steel by welding. Under external loading, cracking is shown to originate in the intergranular structure of the coarse grains in the weld-heated zone. Resistance to crack propagation is adversely affected by the notch sensitivity of that steel structure which is heated within the critical range of the steel. If pretreatment is performed by quenching and drawing or spheroidizing, the sensitivity of the steel to intercritical temperatures is greatly lessened. Localized gas-torch postheating may be an easy and practical way of restoring the properties of the welded plate.

22-723. **Metal-Arc Transfer as Influenced by Some Materials in the Covering of Welding Electrodes.** C. T. Gayley. *Welding Journal,* v. 26, Nov. 1947, p. 693s-704s.

Effect of the basicity of the covering formula on the metal arc transfer of some of the common alloying elements that may be present in the covering, and recovery of the elements in the core wire. Effect of particle size of ferro-alloys on their recovery.

22-724. **Welding Metallurgy**. J. G. Ball. *Metal Industry,* v. 71, Nov. 7, 1947, p. 385-386, 389.

Recent progress in the nonferrous alloy field; microstructure and mechanical properties of welds in copper alloys.

22-725. **Automatic Joining Method.** Gerald Eldridge Stedman. *Steel,* v. 121, Nov. 17, 1947, p. 106, 108.

Method involving horizontal arc welding turns out petroleum tanks on production-line basis.

22-726. **Engineering Aspects of Bolt Variables.** V. E. Hillman. *Iron Age,* v. 160, Nov 20, 1947, p. 62-68.

Functions and limitations of bolts and nuts; suggestions for obtaining better results from bolted assemblies. Procedures for determining tension induced during tightening; variables such as machining, heat treatment, and steel analysis. A table on defects in screw threads and their causes.

22-727. **New Procedures in Stainless Fabrication Evolved by Combined Use of Flame Cutting and Welding.** *Steel,* v. 121, Nov. 24, 1947, p. 89-90.

Application of dry nonmetallic flux, carried by the oxygen stream, to construction of a 12-ft. stainless and nickel-clad base for a Dilts Hydrapulper.

22-728. **Hard Faces Live Long.** H. R. Clauser. *Scientific American,* v. 177, Dec. 1947, p. 255-257.

Application of a coat of wear resistant alloy to a base of less durable metal results in parts that give high-alloy performance without high-alloy costs.

22-729. **Oxy-Acetylene Powder Cutting and Scarfing.** D. H. Fleming, Jr. *Steel,* v. 121, Dec. 1, 1947, p. 96-97, 120, 123, 126.

How the powder-cutting reaction overcomes difficulties encountered in cutting oxidation resistant metals. Production applications to stainless steel, cast iron, and nickel-base alloys.

22-730. **Welding of Ore Bridge Effects Dead Weight Reduction.** *Steel,* v. 121, Dec. 1, 1947, p. 98.

22-731. **Motor Frames Welded by Submerged-Arc.** J. B. Arthur. *American Machinist,* v. 91, Dec. 4, 1947, p. 106-109.

Use of specially built machine and fixtures in fabrication of motor frames on a mass-production basis at new Westinghouse plant.

22-732. **Fine Wires Can Be Welded.** R. T. Gillette. *Welding Engineer,* v. 32, Dec. 1947, p. 42-43, 47.

Welding of wires ranging from 0.0005 to 0.060 in. Metals involved are copper, iron, silver, gold, platinum, tantalum, tungsten, molybdenum, iridium, nickel, palladium, and their alloys.

22-733. **Heavy-Duty Trailer Production.** Walter Rudolph. *Welding Engineer,* v 32, Dec. 1947, p. 54-57.

Welding fabrication procedures.

22-734. **Flash-Welded Draft Gear.** *Welding Engineer,* v. 32, Dec. 1947, p. 58, 60.

Production of new weld-fabricated housing for these gears, which were formerly assembled from cast-steel parts.

22-735. **Advanced Techniques for Pressure Vessels.** Gerald Eldridge Stedman. *Welding Engineer,* v. 32, Dec. 1947, p. 36-40.

Several techniques developed by Goslin-Birmingham Mfg. Co., Birmingham, Ala.

22-736. **Welded Pipe Line "Down Under".** J. M. C. Corlette and W. S. Smallman. *Welding Engineer,* v. 32, Dec. 1947, p. 44-47.

Construction of 54-in., mild-steel water line in Australia.

22-737. **Crowd Gear Gets a New Set of Teeth.** *Welding Engineer,* v. 32, Dec. 1947, p. 52-53.

Welding repair of teeth on large cast-iron gear for English-made power shovel.

22-738. **Problems in Pipe Fitting.** *Welding Engineer,* v. 32, Dec. 1947, p. 51.

Installation of pipe lines in Cleveland Clinic addition which called for many varied applications of welding.

22-739. **Comparisons in Welding Between the Old and New Aircraft Car-**

riers "Ark Royal". *Welder,* v. 16, July-Sept. 1947, p. 51-54.
Constructional details.

22-740. Tensile Impact Tests on Welds at Low Temperatures. Otto H. Henry. *Aluminium and the Non-Ferrous Review,* v. 12, July-Sept. 1947, p. 52.
Test results on aluminum alloy welds as described in B. S. theses of George L. McFarland, Jr., and George P. De Rosa at Polytechnic Institute of Brooklyn.

22-741. A 12-Ton Mobile Excavator Crane. *Welder,* v. 16, July-Sept. 1947, p. 55-57.
Construction of welded crane.

22-742. Operation "Shark". *Welder,* v. 16, July-Sept. 1947, p. 57-62.
Welded sectional dock units used to insure speedy rehabilitation of French seaports after the invasion.

22-743. Tubular Steel Roof Trusses for Arcon Temporary Prefabricated Houses. *Welder,* v. 16, July-Sept. 1947, p. 63-66.
Design details and jigging method for welding assembly.

22-744. Repairs to U.S. S.S. "American Farmer". *Welder,* v. 16, July-Sept. 1947, p. 68-71.
Repair procedures for ship which was seriously damaged by collision.

22-745. Welding of Copper and Copper Alloys. *Aluminium and the Non-Ferrous Review,* v. 12, July-Sept. 1947, p. 66.
Outlines paper to be published in *Transactions of the Institute of Welding.*

22-746. How to Select Mild Steel Arc Welding Electrodes. H. O. Westendarp, Jr. *Steel Processing,* v. 33, Nov. 1947, p. 679-680, 703.
The more important welding conditions and requirements, and the general procedures recommended for selecting the best electrode for the job.

22-747. Stud Welding. *Machinery Lloyd (Overseas Edition),* v. 19, Nov. 8, 1947, p. 93-95.
Cyc-Arc system.

22-748. Advantages and Applications of Controlled Atmosphere Copper Brazing. Frank Humberger. *Industry and Welding,* v. 20, Dec. 1947, p. 26-29, 58-61.
Advantages; suggested redesign applications; practical procedures.

22-749. Flame Cutting Stainless. G. E. Bellew. *Industry and Welding,* v. 20, Dec. 1947, p. 30-31, 34.
Some applications of flux-injection method.

22-750. Commercial Applications of Argon-Arc Welding. J. L. Adams. *Industry and Welding,* v. 20, Dec. 1947, p. 36-38.
Several applications and further possibilities for use on such alloys as stainless, Inconel, everdur, copper, and cast iron.

22-751. Welded Design Takes the Shock. *Industry and Welding,* v. 20, Dec. 1947, p. 40-42, 63-64.
Production of welded draft gears for absorbing freight-car shocks. Submerged-arc welding, induction heating, and automatic flash welding used.

22-752. Designing for Resistance Welding. Ernie Lauter. *Industry and Welding,* v. 20, Dec. 1947, p. 54-55.

22-753. 700 Pipe Flanges per Month Are Salvaged on Beveling Machine Built From Scrap. Vernon Starr. *Petroleum Processing,* v. 2, Dec. 1947, p. 918.
Use of home-made beveling machine. Flame-cutting technique.

22-754. Soldered Ceramic-to-Metal Seals. A. L. Jenny. *Product Engineering,* v. 18, Dec. 1947, p. 154-157.
Design of a relatively simple and little-known type of gasketless seal for making gas-tight joints between ceramic and metal.

22-755. Spot Welded Aluminum Components Designed for Repeated Loads. Robert C. McMaster and Horace J. Grover. *Product Engineering,* v. 18, Dec. 1947, p. 158-161.
Results of two separate series of tests, one to investigate the effect of spot welded connections on the static and fatigue strength of stiffened panels in compression and the other for the effect of spot welds joining stressed and unstressed attachments to tension members.

22-756. Aluminum Strips Butt Welded for Cyclotron Magnet Coil. I. A. Oehler. *Iron Age,* v. 160, Dec. 4, 1947, p. 80-83.
Some 1700 50-ft. lengths of aluminum strip of 5/16x4-in. cross section were butt welded to form the field coils of the new cyclotron at the University of Rochester, using a standard flash welder with continuously fed strip.

22-757. Ductility of Steels for Welded Structures. A. B. Kinzel. *Metal Progress,* v. 52, Nov. 1947, p. 795-799.
Ductility is shown to be the essential factor involved in weldability. The various test methods are critically discussed and results of testing of 15 commercial steel heats (5 plain carbon, 6 low-alloy structural, and 4 engineering alloy steels) are summarized. Gives recommendations for testing under practical conditions. (To be published in *Transactions of the American Society for Metals, 1948.* Condensed from Campbell Memorial Lecture.)

22-758. Ductility of Steels for Welded Structures. *Steel,* v. 121, Dec. 8, 1947, p. 91-92, 108, 111.

Presents results of research sponsored by Union Carbide and Carbon Research Laboratories. (See item 22-757.)

22-759. Development of Welding Standards. A. F. B. Nall. *Transactions of the Institute of Welding,* v. 10, Oct. 1947, p 138-140.

Procedure followed in the preparation of British standards. Some of the arguments for and against standards; standardization in relation to the welding industry in particular. Organization of the British Standards Institution, Welding Section.

22-760. Stud Welding Development and Application. A. H. Bent. *Transactions of the Institute of Welding,* v. 10, Oct. 1947, p. 141-145.

Stud-welding technique in a plant making rectified transformer equipment.

22-761. Ship Welding as Practiced on the River Wear. R. C. Thompson and J. P. Allan. *Transactions of the Institute of Welding,* v. 10, Oct. 1947, p. 146-148.

22-762. Investigation of the Strength of Bronze Welded Joints. M. S. Fisher and H. Brooks. *Transactions of the Institute of Welding,* v. 10, Oct. 1947, p. 149-160.

Bronze welded joints in various types of steel were tested mechanically and examined microscopically. Suitable types have about the same static strength as similar oxy-acetylene fusion welds but are not quite so strong as arc welds.

22-763. Radiographing and Controlled Low-Temperature Stress Relieving of Welded Tanks for Wet Seal Gas Holder. Rudolf Kraus. *Welding Journal,* v. 26, Dec. 1947, p. 1073-1079.

Procedures for a tank 38 ft., 2 in. high and 276 ft., 6 in. in diameter of steel ½ to 1⅞ in. thick, the largest welded tank in the world. (Presented at the 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.)

22-764. Submerged Melt Welding of Hardenable Steels. E. A. Clapp and E. L. Frost. *Welding Journal,* v. 26, Dec. 1947, p. 1079-1082.

Control of cooling rates of welded assemblies as affected by preheat temperatures and welding conditions. Use of isothermal - transformation - curve data to determine proper preheat and postheat temperatures is recommended. (Presented at 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.)

22-765. Welding in Assembly Line Production of Refrigerator Cabinets. P. Bowman. *Welding Journal,* v. 26, Dec. 1947, p. 1083-1086.

Presented at 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.

22-766. Design of Arc Welded Steel and Its Relation to Costs. R. H. Davies. *Welding Journal,* v. 26, Dec. 1947, p. 1087-1090.

Presented at 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.

22-767. White Metal Welding. A. E. Speck. *Welding Journal,* v. 26, Dec. 1947, p. 1091-1093.

Methods which can be successfully used for white or die-cast metal by welding shops, garages, and automobile repair shops.

22-768. Electric Arc Stud Welding. Robert C. Singleton. *Welding Journal,* v. 26, Dec. 1947, p. 1095-1101.

Equipment, techniques, applications, and metallurgical aspects. Results of mechanical testing of such welds. (Presented at 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.)

22-769. Welded Plate Buggies Save Time on Tank Construction. Max Alth. *Welding Journal,* v. 26, Dec. 1947, p. 1118.

Time and cost-saving technique used in constructing storage tanks.

22-770. Automatic Welders Increase Trailer Body Output. *Welding Journal,* v. 26, Dec. 1947, p. 1128.

22-771. Static and Fatigue Strengths of Welded Joints in Aluminum-Manganese Alloy Sheet and Plates. R. L. Templin and Marshall Holt. *Welding Journal,* v. 26, Dec. 1947, p. 705s-711s.

Results of extensive investigations involving Alcoa 3S sheet and plate.

22-772. A Study of Projection Welding. W. F. Hess and W. J. Childs. *Welding Journal,* v. 26, Dec. 1947, p. 712s-723s.

Effects of projection size, weld time, electrode force and welding current on weld formation, using A.I.S.I. 1010, 1015, and 1020 steel in 0.062 and 0.125-in. thicknesses. (Presented at 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.)

22-773. Some Factors Controlling the Ductility of 25% Cr, 20% Ni Weld Deposits. O. R. Carpenter and N. C. Jessen. *Welding Journal,* v. 26, Dec. 1947, p. 727s-740s; discussion, p. 740s-741s.

Effects of varying amounts of carbon, manganese, and silicon on weld ductility as determined on different heats of core wire, and application of the data to the specifying of a core-wire analysis which will produce a

minimum of microdefects in deposited 25% Cr, 20% Ni welds. (Presented at 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.)

22-774. Effect of Manganese and Molybdenum on the Microstructure and Mechanical Properties of Low-Alloy Ferritic Weld Metal. William G. Benz, Jr. *Welding Journal,* v. 26, Dec. 1947, p. 742s-748s.

Results of investigation.

22-775. Flame Deseaming. Fred Judelsohn. *Iron and Steel Engineer,* v. 24, Dec. 1947, p. 51-53; discussion, p. 53-54.

Cost advantages on steel plate, particularly where defects are deep or where 100% skinning is necessary. (Presented at A.I.S.E. Philadelphia District Section Meeting, Dec. 7, 1946.)

22-776. A Brief Review of Brazing Processes. (Continued.) H. R. Brooker. *Sheet Metal Industries,* v. 24, Dec. 1947, p. 2457-2462; discussion, p. 2462-2466.

Procedure for torch brazing; heating by fixed torches; furnace brazing; induction brazing; dip brazing; salt-bath brazing; and brazing of aluminum. (To be continued. Presented at Autumn Conference of the Sheet and Strip Metal Users' Technical Association.)

22-777. The Metallurgical Aspects of Fusion Welding in Relation to the Weldability of Steels. H. Granjon. *Sheet Metal Industries,* v. 24, Dec. 1947, p. 2475-2477.

Changes observed on heating and on cooling, and determination of weldability. (To be continued.)

22-778. Discussion of Technical Papers on the Development of Strong Aluminum Alloys for Welding; Presented at the First Session of the British Welding Research Assoc. Symposium on the Welding of Light Alloys. *Sheet Metal Industries,* v. 24, Dec. 1947, p. 2484-2488, 2490.

22-779. Stainless Steel Piping; Fabrication by Welding. *Heating, Piping & Air Conditioning,* v. 19, Dec. 1947, p. 73-78.

Preparation of stainless pipe joints for welding, welding processes, and heat treatment after welding.

22-780. Phonograph Turntables Produced by High Production Welding With Battery Welders. *Tool and Die Journal,* v. 13, Dec. 1947, p. 100.

22-781. Brazing Stages Its Comeback. *Modern Industry,* v. 14, Dec. 15, 1947, p. 46-49.

Numerous new applications of brazing in mass production.

22-782. Seam Welding Composite Plates. O. R. Carpenter. *Steel,* v. 121, Dec. 22, 1947, p. 64-66, 83-84.

Method using overlapping spot welds. Equipment, applications, and metallurgical considerations; a new variation of the slabbing process. (Presented at Petroleum Conference of A.S.M.E., Houston, Texas, Oct. 5-8, 1947.)

22-783. Welding Characteristics of High-Temperature Alloys. C. G. Chisholm. *Steel,* v. 121, Dec. 29, 1947, p. 54-56, 58, 60.

Most high-temperature materials can be joined by practically all welding methods. Choice of joining process depends upon equipment available and part to be welded, as well as service for which it is intended.

22-784. Mechanized Scarfing Conditions; $4\frac{1}{32}$ x $5\frac{3}{16}$-In. Billets at Average Rate of 125 Ft. Per Min. *Steel,* v. 121, Dec. 29, 1947, p. 74, 76.

Use of type CM-38 Lin-De-Surfacer scarfing machine to replace 50 hand chippers.

22-785. Resorts to Battery Power in Mass-Welding Phonograph Turntables. *Steel,* v. 121, Dec. 29, 1947, p. 76.

22-786. De Nieuwe Ontwikkeling Van het Smit-Unionmelt Laschprocede. (New Development of the Smit-Unionmelt Welding Process.) *Smit Mededelingen,* v. 2, Jan-March 1947, p. 14-32.

Dutch modifications of the Unionmelt process.

22-787. Un Essai de Soudabilite Operatoire. (A Test of Operative Weldability.) R. Woirin. *Soudure et Techniques Connexes,* v. 1, March-April 1947, p. 48-55.

Test consists of making a number of "localized fusions" under normal welding conditions on a piece of sheet metal. The probable diameter and appearance of the holes next to the local seams assist in classifying the sheet metal.

22-788. La Soudure au Salon de l'Aeronautique. (Welding at the Aeronautics Salon.) H. Gerbeaux. *Soudure et Techniques Connexes,* v. 1, March-April, 1947, p. 56-66.

Examples of welding viewed at recent French show.

22-789. Le Soudage d'un Reservoir Prototype de 3,500 m³—Syteme Caquot. (Welding a 3,500 Cu.m. Prototype Reservoir — Caquot System.) H. Gerbeaux. *Soudure et Techniques Connexes,* v. 1, May-June 1947, p. 107-115.

Construction of welded spherical reservoir by a combination of oxy-acetylene and arc welding.

22-790. La Soudure a la Foire de Paris. (Welding at the Paris Fair.) R. Salelles. *Soudure et Techniques Connexes,* v. 1, May-June 1947, p. 116-123.

22-791. 3e Congrès National de l'Aviation Francaise. (Third National Congress of French Aviation.) A. Leroy. *Soudure et Techniques Connexes,* v. 1, May-June 1947, p. 124-128.

Papers concerned with welding in aeronautical construction.

22-792. Conséquences, pour la Qualité de la Desserte, du Raccordement des Postes de Soudage a l'Arc sur les Réseaux de Distribution d'Energie Electrique à Basse Tension. (Effects, With Respect to Stability of the Supply, of the Methods of Connection of Arc-Welding Machines to Distribution Networks for Low-Voltage Electrical Energy.) R. Bourdon. *Soudure et Techniques Connexes,* v. 1, July-Aug. 1947, p. 153-163.

In order to avoid reducing the amount of electrical energy available to other users during welding operations, three modifications of the usual welding circuit are proposed. Theory and practical performance of each type.

22-793. Application de la Soudure Electrique par Points à la Construction de Cellules d'Avions. (Application of Electric Spot Welding to the Construction of Aircraft Fuselages.) G. Caillette. *Soudure et Techniques Connexes,* v. 1, July-Aug. 1947, p. 163-179.

A résumé of current methods of spot welding airplane parts, particularly light alloys.

22-794. Weldability of "S.Kh.L.2" Low-Alloy Steel. N. N. Rykalin and L. A. Fridliand. *Avtogennoe Delo (Welding),* Sept. 1947, p. 1-8. (In Russian.)

Weldability of steel which contains 0.14 to 0.22% C; 0.61 to 0.74% Mn; 0.39 to 0.48% Si; 0.59 to 0.67% Cr; 0.42 to 0.68% Ni; 0.28 to 0.44% Cu; 0.07 to 0.08% Mo; 0.02 to 0.03% S; and 0.028 to 0.039% P, using different thicknesses and different electrode materials, compositions of which are given.

22-795. "Ts.M.6" Electrodes. A. A. Alov. *Avtogennoe Delo (Welding),* Sept. 1947, p. 8-11. (In Russian.)

A new coated electrode for welding low-carbon steels. The coating contains 33% hematite; 24.6% sand; 4.4% marble (largely calcium carbonate); 6.3% feldspar; 27.0% ferromanganese; 4.7% starch; and 25 to 30% soda-lime glass. Chemical composition of each component, of the mixture, and of the weld metal obtained. Use of this electrode; method of coating.

22-796. Welding Under Subzero Temperature Conditions. V. D. Taran. *Avtogennoe Delo (Welding),* Sept. 1947, p. 12-17. (In Russian.)

Investigation of a series of weld failures under subzero conditions. Chemical and mechanical properties of metal from welds which failed. Recommends testing at room temperature and at −48° C. to establish quality. Need for research on the problem.

22-797. Electrode Coatings for Welding of Low-Alloy Steel. A. N. Shashkov, S. K. Zvegintsev, and T. N. Dubova. *Avtogennoe Delo (Welding),* Sept. 1947, p. 17-20. (In Russian.)

Two types of coatings are based on ferromanganese and on ferrotitanium. Uses of each.

22-798. Spot Welding of Structural Alloy Steels. S. S. Astaf'ev. *Avtogennoe Delo (Welding),* Sept. 1947, p. 21-24. (In Russian.)

U. S. methods and their applicability to standard structural alloy steels of the U.S.S.R. 10 ref.

22-799. Electric-Arc Welding of Aluminum and Its Alloys. F. I. Razdui. *Avtogennoe Delo (Welding),* Sept. 1947, p. 25-26. (In Russian.)

Methods are critically compared.

22-800. Salt-Bath Brazing. L. E. Fedotov. *Avtogennoe Delo (Welding),* Sept. 1947, p. 26-27. (In Russian.)

Method using a neutral gas atmosphere. Mechanical strength of soldered joints.

22-801. Jigs for Welding and Cutting. N. I. Kazakov. *Avtogennoe Delo (Welding),* Sept. 1947, p. 27-30. (In Russian.)

22-802. New Methods for Electric Arc Welding. N. A. Katsnel'son. *Avtogennoe Delo (Welding),* Sept. 1947, p. 32-33. (In Russian.)

Use of multiple-core electrode combinations; method of connection to the power source. These combinations are units of two to five cores with spaces between them filled with the coating material. Improved results are claimed.

22-803. The Spot Welding of Alclad 24S-T in Thicknesses of 0.064, 0.081, and 0.102 In. W. F. Hess, R. A. Wyant and F. J. Winsor. *National Advisory Committee for Aeronautics Technical Note No. 1411,* Nov. 1947, 25 p.

Results of investigation.

22-804. The Effect of Preheating and Postheating on the Quality of Spot Welds in Aluminum Alloys. W. F. Hess, R. A. Wyant, and F. J. Winsor. *National Advisory Committee for Aeronautics Technical Note No. 1415,* Nov. 1947, 20 p.

Results of investigation.

22-805. Welding. *Russian Technical Research News,* v. 1, Nov. 1947, p. 31. (Abstracted from "Investigation of the Weldability of Heat Resistant Austenitic Chrome-Nickel-Tungsten Steel of Large Cross Section," by K. V. Liubavskii and

F. I. Pashukanis, *Avtogennoe Delo,* no. 8-9, 1946, p. 8-16.)

Outlines results of investigation of weldability of steels with 0.40 to 0.50% C; 13 to 15% Cr; 13 to 15% Ni; 0.30 to 0.80% Si; 0.40 to 0.60% Mo; and 2.0 to 2.75% W, suitable for high-temperature use.

22-806. **Welding in Car Repairs.** H. E. Gannett. *Railway Mechanical Engineer,* v. 121, Dec. 1947, p. 688-690, 694.

Factors affecting the success of welds; test results. (Condensed from paper presented at April 14 meeting of the Car Foremen's Association of Chicago.)

22-807. **Riveting Skin Joints.** *Aircraft Production,* v. 9, Dec. 1947, p. 443.

Some problems encountered in large aircraft. (Condensed from "Structural Problems of Large Aircraft", by Henry Knowler given at R.Ae.S-I.A.S. Anglo-American Conference.)

22-808. **New Pressure-Welding Processes.** Paul Reed. *Oil and Gas Journal,* v. 46, Dec. 20, 1947, p. 64.

New procedure using either electric resistance or oxy-acetylene welding. The plan for welding pipe of all sizes is to line up and apply hydraulic clamps at the junctures of pipe joints well in advance of welding operations.

22-809. **Ductility of Steels for Welded Structures (1947 Edward DeMille Campbell Memorial Lecture).** Augustus B. Kinzel. *Transactions of American Society for Metals,* v. 40, 1948, p. 27-82.

Previously abstracted from condensed version in *Metal Progress.* See item 22-757.

22-810. **Practical Importance of Hydrogen in Metal-Arc Welding of Steel.** S. A. Herres. *Transactions of American Society for Metals,* v. 39, 1947, p. 162-189; discussion, p. 189-192.

Previously annotated in R.M.L., v. 3, 1946, item 22-533.

22-811. **Removal and Repair of Steel Casting Defects.** R. A. Pomfret. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 190-195.

Previously annotated in R.M.L., v. 2, 1945.

22-812. **Welding Methods for Gray Iron Castings.** L. F. Granger. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 208-212.

22-813. **A Study of the Behavior of Rutheniopalladium in Torch Flames, With the Object of Improving Soldering Technique.** R. H. Atkinson and G. P. Gladis. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 426-434; discussion, p. 435.

Previously annotated from *Metals Technology,* April 1946, T.P. 1982, in R.M.L., v. 3, 1946.

22-814. **A Preliminary Investigation of the Constitution of Mild-Steel Arc-Weld Deposits.** H. A. Sloman, T. E. Rooney, and T. H. Schofield. *Symposium on Metallurgy of Steel Welding (British Welding Research Assoc.),* 1947, p. 19-36; discussion, p. 41-46.

Previously annotated from *Journal of the Iron and Steel Institute,* v. 152, no. 2, 1945, p. 127P-153P. See R.M.L., v. 2, 1945.

22-815. **An Analytical Examination of Weld Deposits From Commercial Mild Steel Electrodes to Specification B.S.S. 639A and the Manufacture of Artificial Weld Metal.** G. L. Hopkin. *Symposium on Metallurgy of Steel Welding (British Welding Research Assoc.),* 1947, p. 37-39; discussion, p. 41-46.

Part I deals with the analytical examination with particular reference to nitrogen. Part II was intended to deal with the effect of nitrogen on the mechanical properties of cast metal, but this was found impracticable so it deals only with the results which led to the decision that such an investigation was impracticable at this stage.

22-816. **Comments on the Role of Hydrogen in Relation to the Cracking of Alloy Steels on Welding.** G. L. Hopkin. *Symposium on Metallurgy of Steel Welding (British Welding Research Assoc.),* 1947, p. 40-41; discussion, p. 41-46.

22-817. **Constitution of Weld Metal; Results of Research Arising From Practical Problems.** W. Andrews. *Symposium on Metallurgy of Steel Welding (British Welding Research Assoc.),* 1947, p. 5-18; discussion, p. 41-46.

Details of extensive research on three allied problems and results obtained. Analyses of the weld metal from about 20 commercial mild steel electrodes, representing the majority of the types in use, were obtained. Deposits from four or five of these electrodes were examined for gas content by the vacuum-fusion process. Detailed analyses of the same weld metal by the iodine-extraction process were also carried out. Metallic-arc weld deposits made with anhydrous fluxes were examined in the same way. Results are summarized under: effects of gases; condition of S and P in the weld metal; and porosity. 21 ref.

22-818. **The Relation Between the Hydrogen Content of Weld Metal and Its Oxygen Content.** L. Reeve. *Symposium on Metallurgy of Steel Welding (British Welding Research Assoc.),* 1947, p. 48-54; discussion, p. 65-71.

The main purpose of the investiga-

tion reported is to determine the relationship between the FeO content of weld metal and its total and diffusible hydrogen content. The total hydrogen content is slightly reduced, while the diffusible hydrogen content is considerably reduced, when the FeO content is increased. An attempt is made to explain these results theoretically on the basis of data reported by Chipman and Lepp. The influence of micro-cavities and of inclusions. 18 ref.

22-819. **Influence of Sulphur and Phosphorus on Weldability of Mild Steel.** L. Reeve. *Symposium on Metallurgy of Steel Welding (British Welding Research Assoc.)*, 1947, p. 55-64; discussion, p. 65-71.

Certain observations on the influence of S, P, and to a lesser extent, C, on the cracking tendency of mild steel weld metal, and the influence of the type of electrode on this phenomenon. 13 ref.

22-820. **Fourth Session; Weldability Testing.** *Symposium on Metallurgy of Steel Welding (British Welding Research Assoc.)*, 1947, p. 95-98.

Current research by the B.W.R.A. on weldability testing. Proposed apparatus.

22-821. **Electro-Physics of the Welding Arc.** L. H. Orton. *Symposium on Metallurgy of Steel Welding (British Welding Research Assoc.)*, 1947, p. 98-100; discussion, p. 100-102.

Various theories which have been proposed and recent research in Britain and elsewhere.

SECTION XXIII

INDUSTRIAL USES AND APPLICATIONS

23-1. **Magnesium in Electrical Batteries.** Harold A. Knight. *Materials & Methods,* v. 24, Dec. 1946, p. 1469-1472.

Development work; comparison of magnesium batteries with conventional cells.

23-2. **Welded Wrought Iron "Channels".** *Steel,* v. 119, Dec. 30, 1946, p. 84.

Protective covers, fabricated of wrought iron plate, cover spalled concrete spandrels of an eight-story building in Chicago. Fabrication problem.

23-3. **What's the Matter With Cast Iron?** A. A. Weidman. *Society of Automotive Engineers Preprint,* 1946, 22 p.

Problems involved in the actual design in making castings, machining them, and the uses to which castings best can be put.

23-4. **Aluminum for Water Works Structures.** John M. Perryman. *Journal of the American Water Works Association,* v. 38, Dec. 1946, p. 1327-1329.

Use of aluminum for a 500,000-gal. water tank and auxiliary structures at Macon, Ga. Also recommends use of aluminum alloys for filter gallery piping. Corrosion resistance is said to make this metal most economical in the long run.

23-5. **A Modern Electric Boiler Installation at Arvida.** F. L. Lawton and M. G. Saunders. *Light Metals Review,* v. 6, Dec. 6, 1946, p. 27-28.

Boilers are insulated with aluminum foil, air cell insulation covered with an outside casing of aluminum sheet. Also, the main steam header, steam piping and connections to the main steam distribution line are insulated in a similar manner. Aluminum foil is fireproof, does not absorb moisture with consequent loss of heat insulating properties, and is permanent. Details of application of this insulation. (Abstracted from *Engineering Journal,* v. 29, May 1946, p. 290-298.

23-6. **Cleveland Commentary: Aluminum Prospects and Problems.** L. Pomeroy. *Light Metals Review,* v. 6, Dec. 1946, p. 41-42.

Aluminum in automotive use. (Abstracted from *Motor,* v. 40, Nov. 9, 1946, p. 119-122.)

23-7. **Corrosion Resistant Processing Equipment of Clad Steels for Chemical and Allied Industries.** Everett C. Gosnell. *Corrosion,* v. 2, Dec. 1946, p. 287-306.

Fabricating techniques for clad steel plate, and techniques for selection of material. Design and fabrication of equipment from clad steel. Various industrial applications.

23-8. **Aluminum Die-Cast Engines.** G. C. Robechaud. *Modern Metals,* v. 2, Dec. 1946, p. 15.

New line of light weight industrial engines utilizes high-pressure aluminum die castings throughout.

23-9. **Fundamental Considerations in the Developing Magnesium Industry.** J. D. Hanawalt. *Modern Metals,* v. 2, Dec. 1946, p. 16-23.

Problem of achieving wider acceptance of magnesium. Some of the advantages of magnesium's unique property combinations and obvious fields for application development.

23-10. **Looking Forward to Future Automobile Engines. Part IV.** Alex Taub. *Automotive and Aviation Industries,* v. 95, Dec. 15, 1946, p. 40-42, 58, 60.

Improvements in pistons, rings, valves.

23-11. **The Chemical News Parade. Bosch Process.** *Chemical and Engineering News,* v. 24, Dec. 25, 1946, p. 3356-3357.

German process in which a very thin coating of zinc applied in vapor form directly on the paper dielectric is substituted for the metal foil used in conventional fixed paper condensers. The machinery for the manufacture of the paper has been brought to this country where details are being worked out.

23-12. **The Aluminum Automobile.** W. D. Kendall. *Aluminum and Magnesium,* v. 3, Dec. 1946, p. 20-21, 25.

Main frame of the Kendall is constructed of six aluminum cast members bolted together, with tubular steel transverse bracing members. Unique features of this form of construction. Other design innovations.

23-13. Gramophone Needle Manufacture. *Machinery (London),* v. 69, Dec. 12, 1946, p. 756-757.

Describes methods employed at Needle Industries, Ltd., Studley. Pointing, shearing, scouring, glazing and packing.

23-14. Use of Recently Developed Building Materials in Railway Buildings. Report on Assignment 6 by A.R.E.A. Committee 6—Buildings. *American Railway Engineering Association Bulletin,* v. 48, no. 463, Dec. 1946, p. 300-318.

Materials include, among others, enameled steel tile and structural aluminum.

23-15. A Plumbing Goods Plant. *Western Metals,* v. 4, Dec. 1946, p. 24-27.

Pictures show production processes involved in making faucets from brass stampings and precision-machined brass fittings which are subassembled and permanently silver-brazed. Parts are then sanded, buffed, polished and given an exceptionally heavy chromium plating. Final inspection includes rigid testing for leaks. Product is jewelry-polished to a high finish, packaged and shipped immediately.

23-16. The Development of Light Contructions. All-Steel Lathes. W. Mobius. *Engineers' Digest (American Edition),* v. 3, Dec. 1946, p. 603-606.

Two experimental lathes, one having "cell construction" and the other "tube construction". Cost and weight comparisons, and results of workshop tests and static and dynamic examinations. Latter shows superiority of tubular construction. Development of welded all-steel lathes believed practicable. (Condensed from *VDI-Zeitschrift,* v. 88, May 27, 1944, p. 277-286.)

23-17. Selecting Steels for Casting Dies. Herbert Chase. *Steel,* v. 120, Jan. 13, 1947, p. 98, 100, 109.

In spite of wide differences of opinion on specifications for die steels, many different compositions and heat treatments yield satisfactory results.

23-18. Insulated Cables and Wire in Aluminum. *Light Metals,* v. 9, Dec. 1946, p 648-684.

Practical aspects of the replacement of copper by aluminum; the problem of joining.

23-19. Report on Bristol Type 167. *Aircraft Production,* v. 8, Dec. 1946, p. 561-569.

Description of manufacturing processes continues with an account of the machining and forming of the extruded stringers and a review of the main fuselage assembly.

23-20. Alloy Steels for Welded Locomotive Boilers. H. L. Miller. *Railway Mechanical Engineer,* v. 121, Jan. 1947, p. 6-8, 15.

Materials suitable for welded boilers, the welding procedures which should be used, and the possible advantages of stronger materials.

23-21. Briggs Manufacturing Company Achieving High Volume Production With New Porcelain Enameling Facilities. *Better Enameling,* v. 18, Jan. 1947, p. 11-14.

An account of production of steel plumbing fixtures.

23-22. Welded Construction Provides Economical and Rigid Shop Structure. A. F. Davis. *Welding Journal,* v. 26, Jan. 1947, p. 18.

A prefabricated shop building of standard universal design sold by the Butler Manufacturing Co., Kansas City, Mo.

23-23. Progress in the Tin-Consuming Industries. John Ireland. *Metallurgia,* v. 35, Dec. 1946, p. 97-100.

Review is limited to the past two years. Progress directed to tin conservation; the newer uses are exemplified by the application of tin to steel as a pretreatment for paint, electrodeposited tin-zinc alloys as a new protective coating for steel, and flux degassing in bronze manufacture as the avenue to a range of high-quality alloys with greatly improved mechanical and corrosion resistant properties.

23-24. Zinc and Its Alloys. B. Walters. *Metallurgia,* v. 35, Dec. 1946, p. 101-103.

The changeover from wartime to peacetime conditions has affected the various uses of zinc; certain more recent applications of the metal.

23-25. The Use of Isotopes as Tracers. A. H. W. Aten, Jr. and F. A. Heyn. *Philips Technical Review,* v. 8, Oct. 1946, p 296-303.

Possible uses in metallurgical field are: checking the amount of phosphorus in molten steel; checking mercury vapor concentration in air; checking the extent of solution of alloy additions to metals; study of transfer of minute quantities of metal from one surface to another as a factor in friction or lubrication studies. Numerous additional applications to varied fields are discussed briefly.

23-26. Nonferrous Copper Wire for Moving-Coil Meters. P. G. Moerel and A. Rademakers. *Philips Technical Review,* v. 8, Oct. 1946, p. 315-319.

The material for the rotating system of moving-coil meters sometimes contains particles of iron. Their fer-

romagnetism combined with inhomogeneity of the magnetic field causes defects in the measuring instrument. Measures are discussed for keeping the copper wire used for the moving coil as free of iron as possible.

23-27. **The Manufacture of Fish Hooks.** *Machinery (London)*, v. 69, Dec. 26, 1946, p 822-824.
Operations in various stages of their production. Special machinery used.

23-28. **Double-Wall Tubing.** *Steel*, v. 120, Jan. 27, 1947, p. 76, 120-121.
Double-wall tubing made of nickel or monel combines high ductility and other mechanical properties with corrosion resistance. Bonded joints cannot be separated at temperatures under melting point of base metal.

23-29. **Magnesium Bathinette.** L. M. Oldt. *Modern Metals*, v. 2, Jan. 1947, p. 15.
13-lb. unit utilizes extruded magnesium tubing in the main framework. Members are joined together by a slot and key arrangement.

23-30. **Aluminum Architectural Uses Broadening.** E. V. Sharpnack. *Modern Metals*, v. 2, Jan. 1947, p. 16-18.
Rural applications are expanding rapidly, residential uses multiplying and aluminum has distinct industrial appeal.

23-31. **Sandwich Materials: Metal Faces Stabilized by Honeycomb Cores.** W. W. Troxell and H. C. Engel. *Society of Automotive Engineers, Inc., Preprint*, 1947, 12 p.
General advantages and disadvantages of balsa wood and honeycomb. Information pertaining to sandwich constructions having 24S-T alclad aluminum alloy faces and a particular type of honeycomb core, the structure being bonded by one particular adhesive.

23-32. **Experiences of an Aircraft Manufacturer With Sandwich Material.** H. B. Gibbons. *Society of Automotive Engineers, Inc., Preprint*, 1947, 12 p.
Sandwich material is known as "Metalite", faces of which are normally made of high-strength aluminum alloy and the core of a low-density balsa wood. Found advantageous to arrange the balsa with the grain of wood normal to the metal faces. A two-stage bonding operation is employed. In the first stage Cycleweld C-3 cement is cured on the metal faces only. Final bonding of the faces to the core is accomplished with a medium temperature phenolic resin adhesive. This material is fabricated into a few elemental shapes, illustrating flat, single and double curvature forming. Experience with the sandwich material.

23-33. **Philosophy for Design of Sandwich Type Structure.** John F. Korsberg. *Society of Automotive Engineers, Inc., Preprint*, 1947, 7 p.
Requirements of this type of structure for aircraft. Testing procedures, and current and proposed research programs in this field at Boeing Aircraft.

23-34. **Bardco Manufacturing & Sales Company.** *Western Metals*, v. 5, Jan. 1947, p. 18-21.
Story, in pictures with explanatory notes, of the various operations in foundry, machine shop and final assembly for manufacture of motor-generator sets and gates and valves for irrigation systems.

23-35. **Aluminum Advances on All Fronts.** Fred P. Peters. *Scientific American*, v. 176, Feb. 1947, p. 63-65.
Its economic advantages, increased strength, the new clads and some of the other alloys; possibility of wide application.

23-36. **Santa Fe Stainless Steel Refrigerator Car Is Placed in Test Service.** *Railway Age*, v. 122, Feb. 1, 1947, p. 273-275.
Illustrated article describes new 40-ton car.

23-37. **Pools of Steel.** Alden Stahr. *Steel Construction Digest*, v. 4, Jan. 1947, p. 10-11.
Use of welded steel for home swimming pools. (Reprinted from *American Home.)*

23-38. **Welded Steel-Plate Axlebox: L.M.S. Railway.** *Engineering*, v. 163, Jan. 10, 1947, p. 43.
New construction of axlebox used on British railway.

23-39. **Factory-Built Aluminum Houses.** *Machinery (London)*, v. 70, Jan. 9, 1947, p 35-44.
Factory arrangements and press operations in two British factories.

23-40. **Aluminum Luggage.** Erle P. Halliburton, Jr. *Western Machinery and Steel World*, v. 38, Jan. 1947, p. 74-77, 111.
All operations, from raw stock to finished product.

23-41. **Air Skiff by Douglas.** *Western Machinery and Steel World*, v. 38, Jan. 1947, p. 78-80, 112.
Assembly procedures for aluminum boat.

23-42. **Oakland Transformer Plant.** *Western Machinery and Steel World*, v. 38, Jan. 1947, p. 82-85.
How transformers are made. Design; fabrication of wire for coils; assembly of coil forms, steel core, and other parts.

23-43. **Aluminum Tucker "Torpedo".** *Aluminum and Magnesium*, v. 3, Jan. 1947, p. 15, 20.

Automobile has bumper and grill of heat treated aluminum. Doors and rear and front deck panels also made of stamped sheet aluminum. Suspension members are aluminum forgings as are the housings on the hydraulic disk type brakes. Steel is retained as the major component in the chassis, the welded tubing frame, the one-piece top and the fenders.

23-44. Welded Dragline Booms of 150-Ft. Length. H. Gottfeldt. *Transactions of the Institute of Welding*, v. 9, Dec. 1946, p. 189-203.

Development of boom used for strip mining of coal in Britain. Structural design details.

23-45. The Heat's On. *Die Castings*, v. 5 Feb. 1947, p. 17, 31.

Details of an assembly which includes a constant level valve, safety trip mechanism, and a large-capacity, easily cleaned strainer, housed in a corrosion resistant zinc-alloy die casting. Deep intersecting tubular passageways are part of the reason for die casting the housing of this valve for oil burning equipment.

23-46. A Sound Investment. *Die Castings*, v. 5, Feb. 1947, p. 18-20, 35.

Story of part which die castings have played in making the wire recorder economically practical for domestic consumption.

23-47. Some Cost Reduction Factors in Typewriter Design. *Die Castings*, v. 5, Feb. 1947, p. 26-28, 30.

Costs are compared between three gray iron typewriter components and the aluminum die castings which replaced them.

23-48. Thread-Cutting Screws in Die Castings. Harbison Meech. *Die Castings*, v. 5, Feb. 1947, p. 52, 54, 56, 58.

How these screws eliminate manufacturing operations, simplify assembly, and improve fastening.

23-49. Welded Piles for a Pier. Henry Schutz. *Welding Engineer*, v. 32, Feb. 1947, p. 44-45.

A type of steel pile, fabricated by welding H-beams.

23-50. Performance of the New Alnico Permanent Magnet Materials. F. W. Merrill. *Electrical Manufacturing*, v. 39, Feb. 1947, p. 72-77, 182, 184, 186.

After an analysis of permanent magnet theory, the suitability of the newer Alnico alloys, for either fixed or variable air-gap apparatus, is discussed through interpretation of their demagnetization curves.

23-51. Use of Steel Forms for Concrete House Production. Walter J. Brooking. *Iron Age*, v. 159, Feb. 13, 1947, p. 57-62.

Weld fabrication of the steel house forms, method of setting up the forms, pouring of the monolithic structure, and some of the unusual prime movers used in the production process.

23-52. New Methods Aid Volume Output of Industrial Engines. G. C. Robechaud. *Production Engineering & Management*, v. 19, Feb. 1947, p. 55-58.

How generous use of die-cast components, processed with special purpose tools and fixtures, has effected a reduction in weight and cost of industrial gasoline engines at the new West Coast plant of McCulloch Motors.

23-53. Metal Printing. C. W. Dickinson. *Steel*, v. 120, Feb. 17, 1947, p. 112.

Development of offset metal printing, its present and potential applications.

23-54. Electronics Speeds up Today's Factory Jobs. *Electronic Industries & Electronic Instrumentation*, v. 1, Jan. 1947, p. 2-3.

Applications in production of bulldozers at Caterpillar Tractor Co.

23-55. Tools and Techniques for Truck-Trailer Production. Fred M. Burt. *Tool Engineer*, v. 18, Feb. 1947, p. 18-26.

Operating sequences, with some coverage of the manufacture of the huge carryalls and special units at Fruehauf Trailer Co. of California. Straight-line flow and continuity of movement are major factors in efficiency.

23-56. Kitchen and Bathroom Units for Prefabricated Houses. (Continued.) *Machinery (London)*, v. 70, Jan. 16, 1947, p. 73-75.

Processing and assembly at the Works of Sentinel Ltd.

23-57. Assembly Operations on Aluminum Houses. (Continued.) *Machinery (London)*, v. 70, Jan. 30, 1947, p. 131-138.

Equipment and operations involved in cleaning, dipping, stoving and assembly.

23-58. Die Castings in Industrial Design. H. K. Barton. *Machinery (London)*, v. 70. Jan. 30, 1947, p. 148-152.

Various applications of die castings; advantages.

23-59. Specialized Work in Pressure Fittings. Ralph G. Paul. *Western Machinery and Steel World*, v. 38, Feb. 1947, p. 82-85, 123.

Equipment and operations employed in manufacture of special fittings used in connection with the storage and handling of inflammable and explosive liquids.

23-60. Production Line of Water Heaters. Gordon B. Ashmead. *Western Machinery and Steel World*, v. 38, Feb. 1947, p. 90-93, 113-114.

Pictorial story of production of Rheem hot water heaters from raw stock to finished product.

23-61. Modern Methods Characterize Mass Production in Bendix Brake Plant. Joseph Geschelin. *Automotive and Aviation Industries*, v. 96, Feb. 15, 1947, p. 26-30, 74, 76.

Operations and equipment showing straight-line flow of operations, careful subdivision of individual operations, compact departmental layout, complete mechanization, and ingenious revolving-table-type final assembly stations.

23-62. Aluminum Versus Copper. Harold A. Knight. *Materials & Methods*, v. 25, Feb. 1947, p. 61-64.
Aluminum is now a strong contender for many electrical applications.

23-63. Percussive Rock Drilling With Tungsten Carbide Bits. W. W. Varvill. *Mine & Quarry Engineering*, v. 13, Feb. 1947, p. 37-44.
Development of sintered tungsten-cobalt carbide bits in Germany. The design of the bits and auxiliary equipment; production results from use in an iron mine.

23-64. The Role of Vanadium in Gray Iron Castings. Part II. R. G. McElwee and T. E. Barlow. *Vancoram Review*, v. 5, no. 2, p. 14-16.
Properties and application of vanadium cast iron alloys.

23-65. Magnesium Product Developments. L. M. Oldt. *Modern Metals*, v. 3, Feb. 1947, p. 16-17.
Products in the children's equipment field, outside home equipment, sports equipment, and household appliances. Reasons why manufacturers are introducing these new products in magnesium and advantages of the metal.

23-66. Magnesium Reel. *Modern Metals*, v. 3, Feb. 1947, p. 31.
Development of magnesium reel giving material, cost, weight, salvage and life expectancy comparisons with wood and steel.

23-67. Eyes Right. *Die Castings*, v. 5, March 1947, p. 22-24, 50-52.
Aluminum die castings provided exactness of dimension, light weight, strength, and rigidity at a cost far less than possible with any other method, in the Royal Rotoscope, an instrument for controlling and coordinating the muscles of the eye.

23-68. Light Alloys in the Textile Industry. *Light Metals*, v. 10, Jan. 1947, p. 33-53.
Theory and practice of applications of aluminum and magnesium in the cotton, woolen, synthetic fiber and associated industries.

23-69. Turbine Disks. *Iron and Steel*, v 20, Feb. 1947, p. 63-64.
First steels used in Goblin turbine disks were austenitic but it has been found that pearlitic steel withstands variations in temperature better. Properties of the hub section of the disk must be kept under close control.

23-70. Steels for Mold Construction. John H. Burkam. *Industrial Plastics*, v. 2, March 1947, p. 26-27.
The properties of various alloy steels and their suitabilities for plastic mold construction.

23-71. How Metals Help the Angler. *Inco*, v. 21, Winter 1946-1947, p. 10-12.
Application of different nickel alloys to various pieces of fishing tackle.

23-72. Six Precious Platinum Metals Used to Save Money. *Inco*, v. 21, Winter 1946-1947, p. 12-14, 25.
Applications of platinum, palladium, rhodium, ruthenium, iridium, and osmium to industrial uses as well as to jewelry.

23-73. A New Development in Blind Riveting. *Inco*, v. 21, Winter 1946-1947, p. 14-16.
Ways in which blind monel rivets are used.

23-74. Life Stories Important in the Oil Fields. *Inco*, v. 21, Winter 1946-1947, p. 18-19.
Parts of new type of pump for handling sour crude oil are made of monel, except for the graphite-impregnated plastic packing rings.

23-75. Hydraulic Circuits and Applications. Ransom Tyler. *Tool & Die Journal*, v. 12, March 1947, p. 91, 94-95.
Miscellaneous applications of hydraulic systems for metal drawing and spinning equipment, centrifugal casting, machining controls, plastic molding. (To be continued.)

23-76. French Automobile Industry Reborn. *Light Metals*, v. 10, Jan. 1947, p. 3-14.
Growing application of light and ultra-light alloys in French motorcar and commercial vehicle construction. Some interesting contrasts are drawn between design tendencies in France and U.S.A. (From "Salon de l'Automobile" by Maurice Victor, *Revue de l'Aluminium*, v. 23, 1946, p. 321.)

23-77. Aluminum and the Rubber Industry. *Light Metals*, v. 10, Feb. 1947, p. 57-68.
The benefits afforded by aluminum in the production and processing of rubber; applications where the metal possesses established superiority over alternative materials.

23-78. Air Transport and Light Metal. Hedley S. Crabtree. *Light Metals*, v. 10, Feb. 1947, p. 78-86.
Trends and future possibilities of transport aircraft in the light of structural evolution toward more economical production and operation. The part to be played by aluminum and

magnesium, and the attitudes which should be adopted by the industries concerned with these metals.

23-79. **Printing Industry and Light Alloys.** *Light Metals,* v. 10, Feb. 1947, p. 86-96.
Current applications of aluminum alloys in printing plant and equipment, and in printing processes. Theory and practice of the use of magnesum in photo-engraving.

23-80. **Cut Operating Cost—and Increase Payload.** *Light Metals,* v. 10, Feb. 1947, p. 97-102.
An elementary mathematical analysis of the advantages of light-metal construction for the bodywork of commercial vehicles. (From *Revue de l'Aluminium,* v. 23, 1946, p. 315.)

23-81. **Hard Alloys Go Underground.** Sheldon P. Wimpfen. *Mining and Metallurgy,* v. 28, March 1947, p. 148-149.
Tungsten carbide insert bits, a revolutionary development in rock drilling.

23-82. **Developments in the Application of Aluminum Alloys.** E. D. Iliff. *Metallurgia,* v. 35, Feb. 1947, p. 197-201.
Why bigger demands are being made for various forms of wrought aluminum; some of the industrial fields in which aluminum is proving a satisfactory material from an economic as well as a utilitarian point of view.

23-83. **Alnico Materials for Small Motor and Generator Fields.** F. W. Merrill. *Electrical Manufacturing,* v. 39, March 1947, p. 78-83, 180, 182, 184, 186, 188, 190.
Applications of the Alnicos in variable air-gap apparatus.

23-84. **Magnesium, the Metal of Tomorrow.** T. R. B. Watson. *Canadian Chemistry and Process Industries,* v. 31, Feb. 1947, p. 116-121.
Properties and applications of the metal and its alloys in light weight construction, thermal diffusivity, and cathodic protection.

23-85. **Selenium Rectifiers.** Julian Lobenstein. *Machine Design,* v. 19, March 1947, p. 112-114.
Increased-size plates capable of sustaining much higher voltage make them more useful as dry-plate rectifiers for applications such as those found in counting and grading equipment, electrocleaning units, electroplating and other electrochemical apparatus. General characteristics of various types of rectifying equipment.

23-86. **Construction of Welded Freight Cars.** R. L. Rex. *Railway Mechanical Engineer* v. 121, March 1947, p. 132-136.
Methods used by the Milwaukee Road in the mass production of all-welded gondolas. Use of low-alloy high-strength steels.

23-87. **Plants Tell Why They're Swinging to New Materials.** *Modern Industry,* v. 13, March 15, 1947, p. 49-54, 56.
Sweeping changes in materials for products and plant equipment. What and why material was chosen and what it replaced.

23-88. **Economics Favoring Light Alloy Bodies.** *SAE Journal,* v. 55, March 1947, p 67.
Some of the features which offset the higher initial price of aluminum and magnesium. (Digest of a paper "Aluminum and Magnesium in Highway Transportation Bodies," by J. H. Dunn.)

23-89. **Engineering Applications of Controlled Expansion Alloys.** Frederick G. Sefing. *Iron Age,* v. 159, March 20, 1947, p. 46-50.
A number of practical applications of expansivity characteristics of metals wherein improved service life was realized through selection of a material having suitable expansivity. Examples of both high-expansion and low-expansion applications.

23-90. **Aluminum for Ducts.** *Heating Piping & Air Conditioning,* v. 19, March 1947, p. 83.
Experiences of various heating contractors.

23-91. **Stainless Steel Bids for Body Work.** *SAE Journal,* v. 55, March 1947, p. 24-26.
Advantages, disadvantages, and design factors at Fruehauf Trailer Co. (Excerpts from paper "Motor Haulage Bodies of Stainless Steel", by V. M. Drew.)

23-92. **30-Inch Pipeline.** *Steel,* v. 120, March 24, 1947, p. 74-75, 110.
Techniques used in fabrication of manganese steel pipe for a 214-mile high-pressure gas line.

23-93. **Present Trends in Alloys.** *Canadian Metals & Metallurgical Industries,* v. 10, March 1947, p. 25-26.
Alloy steels; stainless steels; high-temperature alloys; alloy cast irons; cast bronzes; high-nickel irons; nickel plating; and nickel and high-nickel alloys.

23-94. **Aluminum Nail Seen New Factor in Special Purpose Field.** T. E. Lloyd. *Iron Age,* v. 159, March 27, 1947, p. 102-103.
Development, and some applications. Present manufacturers.

23-95. **The Martin Outboard Motor.** G. E. Buske. *Modern Metals,* v. 3, March 1947, p. 15-17.
Designed to take full advantage of various properties and manufacturing processes for aluminum.

23-96. Aluminum Windows. *Modern Metals,* v. 3, March 1947, p. 18-19.

Progress in manufacture of aluminum windows. Advantages of producing knocked-down assemblies from an ultimate cost-saving standpoint, as well as building a plant near a source of raw materials.

23-97. Building the "Martin 60". Howard Campbell. *Modern Machine Shop,* v. 19, April 1947, p. 124-130, 132, 134.

The manufacturing operation in the building of the "Martin 60" streamlined outboard motor. Special adaptations of the standard equipment and numerous jigs and fixtures are used in the machining of more than 21 aluminum die castings as well as the fabricating of many aluminum stampings.

23-98. Architecture Awakens to the Value of Light Metals. G. H. Friese-Greene. *Light Metal Age,* v. 5, March 1947, p. 8-13, 33-34.

Applications of the light metals in decorative and practical aspects of architecture.

23-99. Progress in Light Metals. W. C. Devereux. *Light Metal Age,* v. 5, March 1947, p. 23, 33.

Progress made in application of aluminum in England.

23-100. The Controlling Factor. *Die Castings,* v. 5, April 1947, p. 19-21, 36.

Accuracy and durability have been gained by die casting a valve operator and a timing device.

23-101. Die Castings in Automotive Hydraulics. John B. Parsons. *Die Castings,* v. 5, April 1947, p. 24-26, 37-40.

Dura Co. has combined aluminum and zinc alloy die castings, along with powdered metal parts and drawn forms, to turn out a low price hydraulic system which meets cost and service specifications.

23-102. Designed for Strength. *Die Castings,* v. 5, April 1947, p. 32-34.

A photographic enlarger in which a dozen zinc alloy die castings are advantageously employed.

23-103. Magnesium in Army Ordnance. C. H. Corey. *Army Ordnance,* v. 31, March-April 1947, p. 418-419.

Applications of magnesium in the above field.

23-104. Steel for Tomorrow's Oil. H. M. Cooley. *Drilling Contractor,* v. 3, Feb. 15, 1947, p. 39-41.

The metallurgical problems involved in drilling for oil at depths of 20,000 ft.

23-105. Woven Wire Conveyer Belts for High-Temperature Service. Fred L. Hooper. *Steel Processing,* v. 33, March 1947, p. 157-161.

How to select such belts as to alloy type and structural design. Their application to miscellaneous metallurgical mass-production operations.

23-106. The Electrolytic Valve Action of Zirconium. Walter R. Carmody. *Electrochemical Society Preprint 91-9,* 1947, 9 p.

Tests of rectifying properties show that zirconium is a suitable electrode material for an electrolytic rectifier when used with sulphuric acid as the electrolyte. Its behavior is practically identical with that of tantalum, with the exception that its breakdown voltage is somewhat lower. The current capacity of the zirconium electrolytic rectifier is limited by the rate at which it can dissipate the heat generated within the rectifier.

23-107. Over the Horizon in the Rotel. H. L. Yoh. *Steel Horizons,* v. 9, no. 2, 1947, p. 5-7.

Design of prefabricated tourist cottages constructed from panels of either 1½-in. insulation board covered with light-gage stainless steel or stainless bonded to plywood.

23-108. Industrial Electronic Equipment Uses. Part I. W. C. White. *Electronic Industries & Electronic Instrumentation,* v. 1, March 1947, p. 6-7.

A classified bibliography of English-language references to applications of electronics in industry. 154 ref.

23-109. Rigidized Metal Offers New Design Possibilities. *Iron Age,* v. 159, April 3, 1947, p. 63.

Various applications of rigidized metal, along with samples of the typical patterns available. Patterns are all rolled into the sheets by means of especially designed rolls used in a conventional type two-high mill.

23-110. Radiant Heating—Expanding Market for Welding. J. J. Welch. *Welding Engineer,* v. 32, April 1947, p. 52-55.

How radiant heating works and how installations are made.

23-111. Manganese Steel Used on a Slag Dump. *Edgar Allen News,* v. 25, March 1947, p. 780-781.

Use of manganese steel for excavating, screening, elevating, conveying, separating, preparation, and transporting units used in the recovery of steel scrap from openhearth and bessemer slag.

23-112. The Production of Muir Gear Hobbers. *Machinery (London),* v. 70, March 6, 1947, p. 232-238.

Improved layout and methods in the reorganized factory.

23-113. Applications of Woven Wire Conveyer Belts. Part II. Fred L. Hooper. *Industrial Heating,* v. 14, April 1947, p. 586-588, 590, 592, 594, 688.

Types of weaves employed for different services, and the numerous ways in which belts can be installed are given consideration in generalized classes.

23-114. Aluminum for Duct Work. H. F. Johnson. *Heating and Ventilating,* v. 44, April 1947, p. 95-96.

Use of aluminum for heating and ventilating duct work in industrial and domestic installations.

23-115. Carbide Cutters Outlast Steel. *American Pressman,* v. 57, April 1947, p. 38-39.

Detroit News reports total elimination of tool replacement, and almost total elimination of knife sharpening on its Hoe Monorail Stereotype Trimmers, by installation of Carboloy cemented-carbide-tipped knives in place of conventional steel knives.

23-116. Development of Jacketed-Type Steel Drier Rolls. William H. Funk. *Welding Journal,* v. 26, April 1947, p. 314-319.

A number of these rolls designed for use in diverse industries, such as paper making, printing, textile, film processing, plastics, rubber and chemical. General and specific information concerning design.

23-117. Sheet Metal Assembly Improved by Resistance Welding *Welding Journal,* v. 26, April 1947, p. 356, 358.

How sheet-metal display signs are fabricated by resistance welding instead of by bolting and riveting.

23-118. First All-Aluminum Ships Are Planned. *Aluminum Bulletin,* v. 1, March 1947, p. 3.

Two bauxite-carriers soon to be constructed for Alcoa Steamship Co. Results of an eleven-year study of an all-aluminum hull moored at Newport News, Va., led to the decision to build the ships. Paint systems used.

23-119. Aluminum Becoming Increasingly Popular for Packaging. *Aluminum Bulletin,* v. 1, March 1947, p. 4-5.

Some of these uses are illustrated and described.

23-120. Metal-Ceramic Combinations. Louis R. McCreight. *Ceramic Industry,* v. 48, April 1947, p. 110.

Miscellaneous applications.

23-121. One-Piece Bearings Mounted in Steel Shells Solve Crusher Bearing Troubles. Nelson Severinghaus. *Pit and Quarry,* v. 39, April 1947, p. 76.

How Ryertex bearings mounted in solid steel shells overcame trouble with 60x48-in. rock crusher. This crusher was originally fitted with gray-iron half-shell bearings.

23-122. Use Blind Rivets for Locations of Difficult Accessibility. *Electrical Manufacturing,* v. 39, April 1947, p. 93-97, 174, 176, 178, 180.

Numerous applications are illustrated and described.

23-123. Steel Forms Speed Construction of Long Bridge Approach. *Engineering News-Record,* v. 138, April 3, 1947, p. 91-93.

Use of steel forms for the piles, caps, and deck.

23-124. The Milwaukee's 40-Ft. 6-In., 50-Ton, Welded Box Cars. *Railway Age,* v. 122, April 5, 1947, p. 703-704.

Construction details.

23-125. Zirconium and Thorium Electrodes in Discharge Lamps. H. C. Rentschler, D. E. Henry, and W. C. Lilliendahl. *Electrochemical Society Preprint 91-21,* 1947, 6 p.

The application of zirconium and thorium as electrode materials in cold discharge lamps. Experimental data for evaluating the cause of tube blackening in commercial lamps and the elimination of this condition by zirconium. The use of various electrode materials and their relation to lamp operating characteristics. A method for investigating the cause of deterioration in phosphors.

23-126. Light Alloys As Applied to Mining. W. F. Fennell. *Colliery Guardian,* v. 174, March 21, 1947, p. 327-330.

A number of applications of aluminum alloys in British coal mines. (Abstract of a paper read before the South Wales Branch of the Association of Mining, Electrical and Mechanical Engineers.)

23-127. Die Castings in Industrial Design. H. K. Barton. *Machinery (London),* v. 70, March 27, 1947, p. 325-327.

Various applications of die casting include portable light-weight sewing machine, battery tester, hardware, display plaques.

23-128. Good for Life. *Farm Quarterly,* v. 2, Spring 1947, p. 15-21, 129-132.

Different types of prefabricated metal buildings which are available for farm use.

23-129. Minerals for Chemical and Allied Industries. A Review of Sources, Uses and Specifications. Part VIII. Sydney J. Johnstone. *Industrial Chemist,* v. 23, March 1947, p. 154-162.

Lead, lead pigments, and other lead compounds. (To be continued.)

23-130. Nickel-Manganese-Chromium Steel Wire for Aircraft Control Cables. Henry C. Boynton. *Materials & Methods,* v. 25, April 1947, p. 91-93.

Development of a wire ranging from 0.010 to 0.020 in. in diameter, as strong as Type 304 stainless steel. Analysis of the alloy chosen for this development work. Tables give analyses of specimens tested for coefficient of thermal expansion and thermal expansion of aircraft control cables.

23-131. Processing and Fabrication of Stainless Steel Sheet and Plate Products. Part VIII. H. S. Schaufus and others. *Steel Processing,* v. 33, April 1947, p. 219-224.
Important considerations concerning applications of chromium-nickel sheet and plate materials in ultimate service.

23-132. Assembling 150 Automobile Fenders Per Hour. C. W. Hinman. *Steel Processing,* v. 33, April 1947, p. 232-233.
Short-cut method for assembling sheet-steel parts by spot welding them together.

23-133. Aluminum for Air Ducts. G. W. Birdsall. *Sheet Metal Worker,* v. 38, April 1947, p. 51-53, 99.
Recommendations of alloys, tempers, thicknesses, sizes, as well as handling, fabrication, and erection procedures.

23-134. Photo-Engraving Plates in Magnesium. *Light Metals,* v. 10, April 1947, p. 188-192.
Process-engraving techniques developed for magnesium plates in U.S.A. supplemented by examples of line and half-tone work specially executed by Temple Press, Ltd.

23-135. Aluminum Ducts and Pipes. *Modern Metals,* v. 3, April 1947, p. 16-17.
Plant uses aluminum for heating and sheet-metal work.

23-136. The Aluminum Tension Screen. *Western Machinery and Steel World,* v. 38, April 1947, p. 87-89.
Equipment and procedures used by Ry-Lock Co., Leander, Calif.

23-137. San Jose's Pressure Cooker. *Western Machinery and Steel World,* v. 38, April 1947, p. 90-93, 115.
Structural and working parts of continuous pressure cooker and cooler; more than a hundred thousand sealed cans processed per day.

23-138. In-Line Velvet Transportation. *Western Machinery and Steel World,* v. 38, April 1947, p 102-106.
Pictures show machining, welding, and assembly operations to produce motor scooters.

23-139. Office Building Initiates Prefabricated Aluminum Facing Over Reinforced Concrete Frame. *Architectural Forum,* v. 86, April 1947, p. 98-101.
Pictures show various steps in construction.

23-140. Wheels and Axles for the Mining Industry. L. Sanderson. *Mine & Quarry Engineering,* v. 13, April 1947, p. 121-122.
Fabrication procedures.

23-141. Some Steels for Gas Turbines. *Aeroplane,* v. 72, April 4, 1947, p. 340-341.
Properties of four ferritic and two austenitic steels made in Britain. Graphs show their properties. Finished parts described and illustrated

23-142. 1500-Ft. Welded Continuous-Girder Bridge. *Engineering,* v. 163, April 11, 1947, p. 285-286.
Structure near Montreal, Canada, believed to be the longest welded continuous-girder bridge in the world.

23-143. All-Welded Hydraulic Scraper. *Iron Age,* v. 159, April 24, 1947, p. 57.
No castings used in design of unit. Bearing housing welded directly to frame. Other welding applications.

23-144. New York Central Installs 20 Aluminum Alloy Combination Baggage Cars. *Railway Age,* v. 122, April 26, 1947, p. 853-856.
Construction of these cars.

23-145. New Air Marker Installation Heralds New Market for Porcelain Enamel. *Finish,* v. 4, May 1947, p. 27-30.
Description of the marker and installation procedures. Most of the story has to do with development of the C.A.A. project.

23-146. Stainless Steels for Springs. Part I. Harold C. R. Carlson. *Product Engineering,* v. 18, May 1947, p. 103-106.
Properties and workability of stainless steel for springs subjected to corrosive conditions and to elevated or subzero temperatures.

23-147. Kaiser-Frazer Production Innovations. *Automotive and Aviation Industries,* v. 96, May 1, 1947, p. 28-29.
Pictures with brief explanatory notes

23-148. Steel Truck Body Members Standardized for Mass Production. Nelson E. Cole. *Steel,* v. 120, May 5, 1947, p. 96-99, 124, 126, 129, 130, 132, 134, 137, 138.
Construction method that employs standardized stamped truck-body members and simple fabricating techniques. Flexibility of design enables body builders to meet individual truck owners' requirements, using mass-production facilities for custom-built bodies.

23-149. Modern Motor Manufacturing Methods. H. E. Linsley. *Iron Age,* v. 159, May 8, 1947, p. 68-71.
How all-steel, welded-frame Lifeline motors are produced by the use of continuous automatic equipment in a new, fully conveyerized plant.

23-150. Razor Strip. *Iron and Steel,* v. 20, April 1947, p. 143-144.
Steps from the melting of a 10-ton cast of steel to a finished razor blade.

23-151. Reducing Metal Wear With Abrasion Resisting Castings. J. S. Vanick. *American Ceramic Society Bulletin,* v. 26, April 15, 1947, p. 109-116.
A survey of steels and cast irons possessing special merit as wear resisting materials. Laboratory investigation of these materials. How one in-

dustry borrows experience from another is illustrated by an example from the mining industry where records of achievement in abrasion resistance led to the application of Ni-hard in the ceramic industry for muller tires, scrapers, knives, and augers.

23-152. **Production Line Methods at Massey-Harris Co.** *Production Engineering &Management,* v. 19, May 1947, p. 65-74.
How revamped manufacturing techniques and the addition of new tools and equipment are boosting the output of farm machinery.

23-153. **Quantity Production of Welded Passenger Cars.** A. M. Unger. *Railway Mechanical Engineer,* v. 121, May 1947, p. 236-238.
The resistance welding setup of the Pullman-Standard Car Manufacturing Co. for fabricating passenger cars.

23-154. **Rebuilding Worn Drag Bits.** Elton Sterrett. *Oil Weekly,* v. 125, May 12, 1947, p. 55.
Use of tungsten carbide inserts.

23-155. **Manufacture, Selection and Use of Files. Part I.** L. E. Browne. *Steel,* v 120, May 12, 1947, p. 102-105, 132, 134.
Various types of files and their manufacture. (To be continued.)

23-156. **Eight Full Openhearth Heats Used in 1100-Ton Magnet for Navy Super-Cyclotron.** *Steel,* v. 120, May 12, 1947, p. 126.
Photographs illustrate some of the steps taken in the production and assembly of eight solid-steel forgings, weighing an average of 150 tons each, for the magnet of the cyclotron.

23-157. **Peacetime Applications of Some of the Lesser Known War-Developed Minerals.** R. J. Lund. *Ohio State University Engineering Experiment Station News,* v. 19, April 1947, p. 45-48.
New applications of uranium, thorium and the rare earths obtained from monazite sand, indium, tantalum, columbium, lithium, silver, boron, platinum, quartz crystals, calcite, and sapphire.

23-158. **Four New Extrusions for Unit Furniture.** George Fejer. *Light Metals,* v. 10, April 1947, p. 184-188.
Four shapes of extrusions and their use in drawer handles, door handles, sliding-door channels and various other furniture applications.

23-159. **The Silver Side of Lithium.** J. D. Clark and L. G. Bliss. *Foote Prints,* v. 18, no. 2, 1947, p. 3-12.
Development of the use for lithium compounds in industry and how Foote became associated with transitional elements and their ores. Physical and chemical characteristics of lithium.

23-160. **The Use of Zirmet for Gas Absorption.** W. M. Raynor. *Foote Prints,* v. 18, no. 2, 1947, p. 22-24.
Properties, processing methods, and applications of zirconium produced by Foote Mineral Co. for use as a getter in electronic tubes.

23-161. **Automatic Folding and Grooving Machines for the Manufacture of Cans.** *Machinery Lloyd,* v. 19, April 26, 1947, p. 98-101.
Operating and construction details of machine built in three sizes and capable of seaming 2,000 can bodies per hour.

23-162. **New Materials and New Uses for Old Materials.** Milton Male. *Blast Furnace and Steel Plant,* v. 35, May 1947, p. 560-562, 570.
Some recent metallurgical and metal-product developments. Steel for housing; light-gage structural steel.

23-163. **All-Aluminum Prefab.** *American Lumberman & Building Products Merchandiser,* May 10, 1947, p. 76.
Prefabricated home made by Southern States Iron Roofing Co.

23-164. **Aluminum Roof Trusses for an Enginehouse.** *Engineering News-Record,* v. 138, May 15, 1947, p. 98-99.
Structural steel roof trusses, corroded to the point of failure by locomotive gases, were replaced by all-aluminum, shop-fabricated trusses in the Alton & Southern R. R. enginehouse at East St. Louis, Ill. To retard future corrosion the new trusses received one coat of zinc chromate paint and two coats of aluminum.

23-165. **Vital Organ of the Ship.** *Inco,* v. 21, no. 2, 1947, p. 4-7.
Copper alloys for condenser tubes used in ship boilers.

23-166. **Costs Cut 30 to 35% by New Clad Strip.** *Inco,* v. 21, no. 2, 1947, p. 11-12.
Properties and applications of monel or nickel-clad strip developed by Superior Steel Corp., Carnegie, Pa. It is made with cladding on one or both sides.

23-167. **Low-Cost Corrosion Protection.** *Inco,* v. 21, no. 2, 1947, p. 22.
Use of nickel-molybdenum cast iron for corrosion-resistant valve in tidewater power plant.

23-168. **Three Times the Life on a Diet of Sand.** *Inco,* v. 21, no. 2, 1947, p. 28-29.
Propeller shafts on river dredges are protected by monel sleeves for resistance to corrosion and abrasion.

23-169. **Riverside Weddings.** *Oilways,* v. 13, May 1947, p. 1-7.
Production of specialty nonferrous alloys at Riverside Metal Co., Riverside, N. J.

23-170. Manufacture, Selection and Use of Files. Part II. L. E. Browne. *Steel,* v. 120, May 19, 1947, p. 90-92, 130, 132.
Speeds, wear and cost that can be expected, and filing techniques generally used for best results. (To be concluded.)

23-171. Copper and Brass for Jewelry and Its Accessories. *Copper and Brass Bulletin,* May 1947, p. 1-16.
Entire issue consists of an illustrated article on the above subject.

23-172. Magnesium Alloys. T. C. Du Mond. *Materials & Methods,* v. 25, May 1947, p. 99-114.
The most frequently used magnesium alloys and the most satisfactory means of fabricating them into finished products. Available forms; joining; machining; forming and bending; cleaning and finishing; design considerations.

23-173. Fabrication Notes on Corrosion Resistant Alloys. J. C. Holmberg. *Steel Processing,* v. 33, May 1947, p. 285-286, 293.
Problems involved in the fabrication of the two types of stainless steel most commonly used in pressure vessel work—the ferritic and the austenitic. Pickling, heat treatment, working, and welding.

23-174. Steel and Plastics. E. T. Gill. *Iron and Steel,* v. 20, May 1947, p. 185-188.
Materials used for molds and hobs in the plastics industry.

23-175. Washer Bases Fabricated From Sheet. Kenneth F. Brooks. *American Machinist,* v. 91, May 22, 1947, p. 110-112.
Pressing and welding procedures at Nineteen Hundred Corp.

23-176. Specific Industries Show German Production Problems. John Christie. *American Machinist,* v. 91, May 22, 1947, p 137-140.
Metalworking situation in Germany in specific key industries. Production operations on the Volkswagen, only passenger car produced since the war.

23-177. The New Wear Bridge. F. J. Walker. *Light Metals,* v. 10, May 1947, p. 224, 227-228.
The development of bridge design and construction from the time of the earliest timber assembly to the latest project—an aluminum-alloy drawbridge.

23-178. Home Front Surveyed. *Light Metals,* v. 10, May 1947, p. 243-255.
Numerous new applications of aluminum to kitchenware, bottle crates, tools.

23-179. Aluminum as a Reflector. *Light Metals,* v. 10, May 1947, p. 256-262.
A study of the light-reflective properties of a series of metals for the various spectral regions. Superiority of aluminum, especially when properly finished, as a reflector material for infrared, visible, and ultraviolet radiation. (To be continued.) 17 ref.

23-180. From Planes to Caskets. *Western Metals,* v. 5, May 1947, p. 26-27.
Assembly-line production of chromium nickel alloy caskets at Ryan Aeronautical Co.

23-181. Pacific Division, Bendix Aviation Corp. *Western Metals,* v. 5, May 1947, p. 22-25.
Picture story of production methods.

23-182. Getting Squared Away With Stainless. *Modern Industry,* v. 13, May 15, 1947, p. 49-52.
Examples of new design and fabrication ideas; how to adapt them to plant and product.

23-183. Why More Lead Production Is Needed. Felix E. Wormser. *Mines Magazine,* v. 37, April 1947, p. 19-20, 36, 38.
Storage batteries and electric cables use most of the lead. The need for more production of white lead. Uses of lead in paints, plumbing, hospitals, alloys, gasoline, and insecticides.

23-184. Piston-Ring Production. J. A. Oates. *Aircraft Production,* v. 9, May 1947, p. 192-199.
Developments in design; materials and methods; processes used by Wellworthy Piston Rings, Ltd.

23-185. Aluminum for Air Ducts. (Continued.) G. W. Birdsall. *Sheet Metal Worker,* v. 38, May 1947, p. 49-52.
Recommendations for alloys, tempers, thicknesses and sizes, as well as handling, fabrication, and erection procedures.

23-186. Structural Application of 75S-T. George Snyder and Frank J. Crossland. *Light Metal Age,* v. 5, May 1947, p. 6-8, 10.
Properties of 75S-T in terms of its advantages and limitations for aircraft structures.

23-187. Welded-Boiler Locomotives on Canadian Pacific Railway Lines. *Engineers' Digest (American Edition),* v. 4, May 1947, p. 243.
Advantages over riveted construction shown by tests. (Abstracted from *Engineering Journal (Canada),* v. 29, Dec. 1946, p. 717-719, 723.)

23-188. Materials for High-Temperature Piping. *Heating, Piping & Air Conditioning,* v. 19, June 1947, p. 90-91.
Use of chromium-molybdenum steels for high-temperature steam piping.

23-189. Housing on an Assembly Line. A. N. Carter. *Welding Engineer,* v. 32, June 1947, p. 35-39.
Manufacture and assembly of steel-frame prefabricated dwellings.

23-190. Unique Machinery Facilitates Production of Body Hardware. Joseph Geschelin. *Automotive and Aviation Industries,* v. 96, June 1, 1947, p. 38-40.

Use of unique fabrication and polishing machinery, and material-handling devices, combined with a plant layout emphasizing straightline manufacturing departments for each type of product, at Fisher Body's Ternstedt Division, Detroit plant.

23-191. Some Experiments With Tungsten Carbide Tipped Drill Steel. J. H. Bloemsma, R. Ramsay, and O. Deane. *Journal of the Chemical, Metallurgical and Mining Society of South Africa,* v. 47, Jan. 1947, p. 243-275; discussion, p. 275-283.

Experiences with different drill-bit designs in different ores.

23-192. Steam Turbines for Iron and Steel Works. I. V. Robinson. *Journal of the Iron and Steel Institute,* v. 156, May 1947, p. 81-89.

Possible future developments. Design recommendations.

23-193. Aluminum Aircraft Skis. *Modern Metals,* v. 3, May 1947, p. 20-21.

The development of aircraft skis by Federal Aircraft Works.

23-194. The Precipitron Utilizes Aluminum. *Modern Metals,* v. 3, May 1947, p. 22-23.

One of the most important features of the new Westinghouse Electric precipitron is the aluminum dust-collecting cell. How the precipitron works, early developments, and some typical successful installations.

23-195. Aluminum Shower Cabinet. *Modern Metals,* v. 3, May 1947, p. 24.

New application of aluminum.

23-196. Models From Magnesium. *Modern Metals,* v. 3, May 1947, p. 25.

Airplane models, furniture, bridges, are built using kit now on the market.

23-197. Composite Materials Attract Designers of Lighter Structures. *Steel,* v. 120, June 9, 1947, p. 76-79, 98, 100.

Use of metal-to-wood laminates—hard plywood cores singly or doubly faced with a choice of metals in architecture of modern high-speed trains, truck and trailer bodies, commercial furniture, escalators and industrial equipment.

23-198. Bushings From Steel Wool Made by North American Aviation. Charles O. Herb. *Machinery,* v. 53, June 1947, p. 164.

These unique bushings are impregnated with copper completely throughout their structure, and at the same time, are assembled by brazing into landing-gear struts.

23-199. Production of New Motor. *Steel,* v. 120, June 16, 1947, p. 90-92, 109.

Specialized manufacturing techniques used in Fairbanks-Morse's Freeport plant. Axial air-gap design makes motor easily adaptable to machine tools, gear units and other equipment where compactness and modernized appearance are essential.

23-200. Steel Mills Are Large Users of Manganese Steel. *Edgar Allen News,* v. 25, May 1947, p. 825-826.

Some of the types of manganese steel castings used by the steel industry.

23-201. Toolsteels. Part V. L. Sanderson. *British Steelmaker,* v. 13, May 1947, p. 246-249.

Concludes section on toolsteel containing manganese, silicon, vanadium, and molybdenum. A steel containing tungsten, chromium, and vanadium. Properties, applications, and fabrication techniques. (To be continued.)

23-202. Stainless Steel for Springs. Part II. Harold C. R. Carlson. *Product Engineering,* v. 18, June 1947, p. 153-156.

Allowable working stresses, commercial tolerances, heat treatments, current prices, and other data useful in determining the proper type of stainless steel for spring applications.

23-203. High Pressure Oscillating Shower Pipes and Stainless Steel Plates With Rotary Screens. F. F. Frothingham. *Paper Trade Journal,* v. 124, May 29, 1947, p. 118, 120.

Equipment for rotary screening of paper stock. Advantages of this type.

23-204. Purity in Die Castings. J. C. Brigham. *Die Castings,* v. 5, June 1947, p. 17-18, 38-39.

Use of aluminum die castings for portable water-filtration units.

23-205. Die Castings in a Garbage Eliminator. *Die Castings,* v. 5, June 1947, p. 20-22, 40-42.

Manganese steel cutters, pivoting in a die-cast zinc hub, cut garbage so it can be flushed down the drain.

23-206. Die Castings—a la Mode. *Die Castings,* v. 5, June 1947, p. 32-37.

New type of rapid home ice-cream freezer constructed mainly of aluminum die castings.

23-207. Quantity Production of Springs and Bumpers at United States Spring & Bumper Co. Fred Burt. *The Modern Industrial "Press",* v. 9, June 1947, p. 22, 24, 38.

Operational details including forming and machining.

23-208. Techniques Are Improved for Aluminum Therapy. A. W. Jacob. *Engineering and Mining Journal,* v. 148, June 1947, p. 84-88.

Latest engineering aspects of silicosis prevention. (Condensed from pa-

per presented before the Canadian Institute of Mining and Metallurgy, Jan. 1947.)

23-209. Engineering Applications of Electrodeposited Coatings. Myron B. Diggin. *Metal Finishing*, v. 45, June 1947, p. 78-80.
Developments in chromium, nickel, iron, copper, tin, and precious metal plating.

23-210. Wire Cord Tires for Heavy Duty Trucks. Harry P. Coats. *Metal Progress*, v. 51, June 1947, p. 959.
Application for cold drawn steel wire, containing 0.60% Mn.

23-211. Better Tools From Molded Laminates. Lawrence Wittman. *Modern Plastics*, v. 24, June 1947, p. 132-137.
Use of glass fabric impregnated with unsaturated polyester resins and addition-type polymers in production-line fixtures and tools.

23-212. Lustron Corp. *Architectural Forum*, v. 86, June 1947, p. 105-110.
Details of prefabricated, enameled-steel house soon to go into production.

23-213. Production of Swing Spout Faucets. *Tool Engineer*, v. 18, June 1947, p. 24-29.
Plant layout, equipment, materials, and process methods at the General Tire and Rubber Company plant at Pasadena. The faucets are made from brass stampings, brass tubing, and precision-machined brass fittings. These are subassembled and permanently silver-brazed, then sanded, buffed, polished, cleaned, and chromium-plated.

23-214. Work Flow Speeds Job-Shop Welding. *American Machinist*, v. 91, June 19, 1947, p. 147-149.
Production of petroleum-product storage and dispensing units by American Welding & Manufacturing Co., Warren, Ohio.

23-215. New Fields for Stainless. Fred P. Peters. *Scientific American*, July 1947, p. 10-12.
New applications.

23-216. Advanced Production Methods Used at Buick Engine Plant. *Automotive Industries*, v. 97, July 1, 1947, p. 40-41.
Picture story.

23-217. Toroidal Iron Dust Core Coils and Their Possible Uses. *Brown Boveri Review*, v. 33, Aug. 1946, p. 219-221.
Dimensions, properties, and advantages of powdered-iron cores of toroidal shape made by Brown Boveri.

23-218. Carbonetos Duros Cementados. (Hard Cemented Carbides.) Vicente Chiaverini. *Boletim da Associacao Brasileria de Metais*, v. 3, April 1947, p. 333-359.
Principal uses and methods of manufacture of "Widia" cutting tools. Information obtained in American metallurgical research laboratories.

23-219. Over the Horizon Comes the "Beauty-Mobile". *Steel Horizons*, v. 9, no. 3, 1947, p. 5.
Use of stainless steel in mobile beauty shop.

23-220. Pfaudler Found a Way. *Steel Horizons*, v. 9, no. 3, 1947, p. 10-11.
Fabrication of stainless-steel tanks by Pfaudler Co., Rochester, N. Y.

23-221. Hot Seat of Horsepower. *Steel Horizons*, v. 9, no. 3, 1947, p. 23-25.
Manufacture and principles of sodium-cooled valves for aircraft engines.

23-222. 250-Ton Welded Barge. S. Castledine and P. B. Chrich. *Welding*, v. 15, June 1947, p. 244-251.
Methods of construction followed by The Butterley Co., Ltd., for the fabrication of all-welded steel barges.

23-223. Modern Magnetic Materials. H. E. Finke. *Materials & Methods*, v. 25, June 1947, p. 72-76.
Properties and applications of the Alnicos, Cunife, Cunico, Vectolite, and Silmanal. These alloys can be designed to almost any shape, since with one or two exceptions they can be rolled, punched, machined, or ground.

23-224. Manufacture of Balls for Bearings and Pens. James Porterfield. *Materials & Methods*, v. 25, June 1947, p. 97-100.
Processes used in manufacture of tiny balls for instrument bearings and ball-point pens. Use of balls instead of jewels for watch bearings is being considered.

23-225. Chromium-Nickel Caskets. William P. Brotherton. *Western Machinery and Steel World*, v. 38, June 1947, p. 102-104, 125.
Production at Ryan Aeronautical Corp.

23-226. Hydraulics in Mass Production. *Western Machinery and Steel World*, v. 38, June 1947, p. 115-116, 125.
Manufacture of hydraulic forming presses at Hufford Machine Works, Redonda Beach, Calif.

23-227. Aluminum in Rural Construction. Frank B. Hastings. *Sheet Metal Worker*, v. 38, June 1947, p. 48-49.
Use of aluminum roofing and other applications.

23-228. Light Metals for Electronic Equipment. L. A. Hammarlund. *Modern Metals*, v. 3, June 1947, p. 14-15.
Applications to various parts some of which have been made of light metals for the past 37 years.

23-229. **Light Metals for Sculpturing.** Lawrence Tenney Stevens. *Modern Metals,* v. 3, June 1947, p. 18-20.
Applications of aluminum and magnesium.

23-230. **Air Conditioning Accessories.** *Modern Metals,* v. 3, June 1947, p. 26.
New applications of aluminum.

23-231. **Light Alloys in the Internal-Combustion Engine.** *Light Metals,* v. 10, June 1947, p. 265-270.
Historical background; use of light metal in compression-ignition engines; and design and properties of light-alloy pistons. (To be continued.)

23-232. **Aluminex Roof Glazing.** *Machinery Lloyd (Overseas Edition),* v. 19, June 7, 1947, p. 105.
Use of an aluminum alloy for the window frames used in skylights. Unique design holds the glass without leakage or special clips.

23-233. **Magnesium Alloy Developments.** *Aeroplane,* v. 72, June 13, 1947, p. 629-630.
Various applications of magnesium for aircraft components by Essex Aero, Ltd. Use for gas tanks is emphasized by charts showing weight savings.

23-234. **Driving Nails in Steel Flooring.** *Steel,* v. 120, June 30, 1947, p. 98.
Special flooring with grooves to take nails is designed to reduce maintenance costs for railway freight cars, trucks, and trailers. The wooden flooring commonly used needs frequent replacement because of nailing into it to hold freight in place.

23-235. **Metal-Clad Wall Material.** *Steel,* v. 120, June 30, 1947, p. 101.
Unit consisting of a sandwich-type material having exterior and interior facing of steel and core of insulation, such as Foamglas, is expected to reduce construction costs on multistory buildings.

23-236. **Development Work Reduces Product Cost.** J. T. Lancaster. *Production Engineering & Management,* v. 20, July 1947, p. 77-79.
Miscellaneous machining, forming, and assembling processes being used in intermediate sized production shops in Canada.

23-237. **Welded Sheet Metal Brake.** *Linde Tips,* v. 26, July 1947, p. 94.
How to make tool for bending sheet-metal sections up to 12-gage thickness and 6-ft. length.

23-238. **Plug-Welded Dipper Joints.** T. A. Ratkowski. *Welding Engineer,* v. 32, July 1947, p. 54, 56.
Design and construction of welded power-shovel dippers.

23-239. **Metallized Circuits Cut Wiring Costs.** John T. Collier. *Metco News,* v 4, July 1947, p. 6-7.
Descriptive.

23-240. **Aluminum Timing Gears Made by Al-Fin Process.** *Iron Age,* v. 160, July 3, 1947, p. 74.
Process claimed to produce gears substantially stronger than the molded resin-and-fiber gears commonly used in automobile engines. The gears are composed of aluminum alloys chemically bonded to steel hubs.

23-241. **Scientific Design.** *Die Castings,* v. 5, July 1947, p. 24, 26, 28-29.
Varied applications of die castings for school and laboratory equipment produced by W. M. Welch Mfg. Co.

23-242. **Steel Inserts in a Die-Cast Zinc Tube Cutter.** *Die Castings,* v. 5, July 1947, p. 29-30.
Use of inserts of other metals to supplement the physical properties of die castings for a small tube cutter manufactured by the Nye Tool Co., Chicago.

23-243. **Reading on the Ceiling.** J. A. Van Den Broek. *Die Castings,* v. 5, July 1947, p. 32-38.
Describes development of ceiling projector for hospitals, using many die-cast parts (aluminum and zinc).

23-244. **High Strength—Low Weight.** *Die Castings,* v. 5, July 1947, p. 22-23, 45-47.
Use of magnesium die castings for portable-tool parts.

23-245. **Welding: Its Implications and Applications. Part II.** Paul Weidlinger. *Progressive Architecture,* v. 28, July 1947, p. 78-81.
Present and potential applications in building construction.

23-246. **Wrought Iron Used Effectively in Marine-Pier Fire Walls.** *Railway Age,* v. 123, July 5, 1947, p. 49-50.
Use of wrought iron to replace deteriorated concrete fire stops under two piers of the N. & W. R. R. at Lambert Point, Va.

23-247. **Coach-Baggage Car Constructed of Aluminum Alloys.** *Product Engineering,* v. 18, July 1947, p. 104-105.
New car which weighs approximately 34% less than car of conventional steel construction.

23-248. **Toolsteel Production in a Modernized Plant.** R. J. Knerr and H. C. Bigge. *Machinery,* v. 53, July 1947, p. 172-175.
Equipment and techniques used at Bethlehem plant of Bethlehem Steel Co.

23-249. **Fabricating Aluminum Air Ducts.** *Steel,* v. 121, July 7, 1947, p. 93, 124.
Typical setup for use of coiled sheet.

23-250. **Molded Vinyl Phonograph Records.** F. B. Stanley. *Modern Plastics,* v. 24, July 1947, p. 107-111.

Methods of production, development work, and research being conducted at Bakelite Corp.'s Bound Brook Laboratories. Also describes production of records from aluminum disks around which are molded a shell of vinylite resin.

23-251. Added Attraction. O. A. Battista. *Steelways,* July 1947, p. 8-12.
Miscellaneous applications of chromium steels and compounds.

23-252. Arc in the Barnyard. Robert West Howard. *Steelways,* July 1947, p. 16-19.
Varied uses of farm welding outfits.

23-253. Office Machine Production Simplified by Compressed-Air Operated Devices. *Steel,* v. 121, July 21, 1947, p. 110, 144.
Numerous applications of compressed air in manufacture of new type of shorthand machine by Kirk Brevitype Corp., San Diego, Calif.

23-254. Doorknob Production Accelerated by Ingenious Tooling. Herbert Chase. *Iron Age,* v. 160, July 24, 1947, p. 56-61.
New setups used by Yale & Towne, including a nine-station progressive die, an assembly die, and several high-output drills and presses.

23-255. Ford Redesigns for Straightline Production of Radiators. *Automotive Industries,* v. 97, July 15, 1947, p. 45, 87.
New mass-production setup.

23-256. Australian Mosquito Production. W. Green. *Aircraft Production,* v. 9, July 1947, p. 265-266.
Assembly methods used by the de Havilland Division of General Motors.

23-257. Convair 240. G. F. Gerhauser. *Aircraft Production,* v. 9, July 1947, p. 258-264.
Use of fixtures built in master tooling dock for production of American plane.

23-258. Timken Roller Bearings on Union Pacific Stock Cars. *Railway Mechanical Engineer,* v. 121, July 1947, p. 351-353.
Application.

23-259. Making Small Automatics. *Machinery (London),* v. 70, June 26, 1947, p 673-683.
Methods used by British firm.

23-260. The Use of Die Castings in a Film Strip Projector. N. Field. *Machinery (London),* v. 70, June 26, 1947, p 689-692.
Describes and illustrates this application.

23-261. Problems Involved in the Fabrication of High-Temperature Alloys. Gunther Mohling. *American Iron and Steel Institute Preprint,* 1947, 7 p.
A general discussion concerned with that group which exhibits superior strength in the temperature range of about 1200 to 1500° F., especially those developed by Allegheny Ludlum Steel Corp.

23-262. Aluminum Backed Phosphor Screen in Cathode Ray Tubes. Arthur Bramley. *The Electrochemical Society Preprint 91-30,* 1947, 4 p.
An evaluation of the different processes pertinent to the operation of the aluminum-backed cathode-ray tube. Results support the contention that reflection from the aluminum is the major contributor of additional light intensity.

23-263. Some Applications of Tantalum in Electronics. L. F. Yntema and R. W. Yancey. *The Electrochemical Society Preprint 91-33,* 1947, 4 p.

23-264. Quelques Applications des Demi-Produits a Section Variable dans l'Aéronautique. (Several Aeronautical Applications of Semifinished Products Having Variable Sections.) Jean Guillemin. *Revue de l'Aluminium,* v. 24, March 1947, p. 79-83.
The application of semifinished light alloy products having variable cross sections and different shapes is proposed for the aircraft industry (light private planes).

23-265. L'Aluminium et les Conserves Alimentaires. (Aluminum and Canned Foods.) Rene Chevillotte. *Revue de l'Aluminium,* v. 24, March 1947, p. 100-108.
The use of aluminum for cans, stressing its advantages over other metals. Numerous foods may be canned in aluminum.

23-266. Tube-Bending Tool and a Hand Tool for the Determination of Length of Rivets for Various Types of Rivet Heads. *Headquarters Air Materiel Command, Wright Field, Translation F-TS-1915-RE,* May 1947, 3 p.
(From report of *Junkers Flugzeug- und Motorenwerke A. G., Dessau, Germany.*)

23-267. Requirements of Steel for Gas Turbines. H. R. Zschokke and K. H. Niehus. *Journal of the Iron and Steel Institute,* v. 156, June 1947, p. 271-283.
Steels used for military-aircraft gas turbines need only have a life of a few hundred hours, while many years' life is required for the turbines built for most peacetime uses.

23-268. Notes on Use of Aluminum in Domestic Gas Equipment. *Light Metals,* v. 10, July 1947, p. 319-321.
Applications illustrated and discussed.

23-269. Aluminum and Magnesium in the Electrical Industries. B. J. Brajni-

koff. *Light Metals,* v. 10, July 1947, p. 325-332.

The construction and operation of high-voltage electrostatic generators.

23-270. International Magnesium Congress. (Concluded.) *Light Metals,* v. 10, July 1947, p. 333-335.

The future of ultralight-alloy applications and production costs.

23-271. Light Alloys in the Internal-Combustion Engine. (Continued.) *Light Metals,* v. 10, July 1947, p. 369-375.

The significance of weight reduction on static and dynamic characteristics and the use of aluminum alloy pistons. (To be continued.)

23-272. Placer Mining Dredges. Ralph G. Paul. *Western Machinery and Steel World,* v. 38, July 1947, p. 78-81, 112.

Manufacture of the above by Yuba Mfg. Co., Benicia, Calif.

23-273. San Francisco Locomotive Works. *Western Machinery and Steel World,* v. 38, July 1947, p. 82-85.

Production of model locomotives.

23-274. Giant Tools for the Pulp Industry. *Western Machinery and Steel World,* v. 38, July 1947, p. 110-111.

Production of pulp mill-chippers. Operations include forging, flame cutting, and machining.

23-275. Castings to Stampings. D. A. Rogers. *Modern Industrial "Press",* v. 9, July 1947, p. 28.

Outlines above change in production of an adjustable magnifying glass.

23-276. Aircraft Industry One of Largest Users of "Rigid-Tex". E. Weller. *Modern Industrial "Press",* v. 9, July 1947, p. 42, 44.

Applications of new process for imprinting various patterns into metal, thus permitting use of lighter gage materials than would otherwise be necessary. It is applicable to both sheet and strip, ferrous or nonferrous. Another advantage is resistance to marring.

23-277. Characteristics of the Jacketed Steel Drier Roll. George L. Snyder. *Paper Mill News,* v. 70, July 1947, p. 74, 76, 78, 80-81.

Properties and designs of the rolls made by Lukens Steel Co.

23-278. Rhapsody in Motor Speeds; Building U. S. Varidrives in Los Angeles. Gordon B. Ashmead. *Western Machinery and Steel World,* v. 38, July 1947, p. 74-76, 109.

Methods used by U. S. Electrical Motors, Inc.

23-279. New Alloy Discovery Brings Supersonic Flight Nearer. Donald Stokes. *Western Machinery and Steel World,* v. 38, July 1947, p. 100-101.

Production and development of "Nimonic 80" in Britain.

23-280. Steel for Farm Buildings. *American Lumberman & Building Products Merchandiser,* July 19, 1947, p. 56-57.

New type of farm-building construction developed by Carnegie-Illinois Steel Corp., known as site-welded construction.

23-281. Type and Mats Eliminated in Rotary Press Printing. Jerry Walker. *Editor & Publisher,* v. 80, July 19, 1947, p. 5, 54, 56.

How Florida weekly has eliminated line casting from molten metal and plate making from matrices. Engraved magnesium plates are used on either rotary or flatbed presses. I.B.M. electromatic proportional spacing typewriters are used for the copy, which is then photo-engraved.

23-282. Huge Placer Dredges. *Steel,* v. 121, July 28, 1947, p. 90, 92.

216-ft. welded "digging ladder", and 14-cu.ft. Mn steel buckets used to excavate tin-bearing sand and gravel.

23-283. Fabrication of the Crosley Engine. Paul Klotsch. *Steel Processing,* v. 33, July 1947, p. 409-411.

New four-cylinder automobile engine has cylinder block fabricated from steel stampings, steel tubing and screw machine parts. Design and construction.

23-284. Stampings Find Wide Application in Home Construction. *Steel Processing,* v. 33, July 1947, p. 420-423.

Applications in utility units, furnaces, bath tubs, stairs, doors, awnings, roofing, hardware.

23-285. Prefabricated Aluminum Buildings. Philip Murray. *Light Metal Age,* v. 5, July 1947, p. 11-13, 17.

Design and construction of units produced in Britain.

23-286. Aluminum in Trailer Construction. *Light Metal Age,* v. 5, July 1947, p. 15.

Design and construction of trailer coaches by Westcraft, Inc., Los Angeles.

23-287. An Experiment With Tungsten Carbide Bits. C. W. Nicolson. *Mining Congress Journal,* v. 33, July 1947, p. 36-37, 61.

Experiments indicate economy of tungsten carbide bits; where no chert or hard rock is encountered, 100 to 150 ft. of iron ore can be drilled without resharpening.

23-288. Selling Magnesium in Canada. A. C. Norcross. *Modern Metals,* v. 3, July 1947, p. 12-14.

Miscellaneous magnesium items. Potential users of magnesium; reaching the prospect.

23-289. Aluminum Water Pump. *Modern Metals,* v. 3, July 1947, p. 15.
Automotive pump is competitive with conventional cast iron type and weighs 40% less. Other advantages.

23-290. Aluminum Jeep Tops. J. A. Carson. *Modern Metals,* v. 3, July 1947, p 16.
Advantages; construction and assembly.

23-291. Designing a Combination Lighter and Cigarette Case. Fred F. Fukal. *Modern Metals,* v. 3, July 1947, p. 20-21.
Aluminum die castings, stampings and drawn light-gage sheet used.

23-292. Precision Trailer Coaches. *Modern Metals,* v. 3, July 1947, p. 27.
Application of aluminum in coaches made by Westcraft, Inc.

23-293. Bus Bodywork. *Automobile Engineer,* v. 37, July 1947, p. 258-260.
A system of prefabricated framework for passenger vehicles.

23-294. High-Duty Gears. *Automobile Engineer,* v. 37, July 1947, p. 273-274.
Manufacture of special reduction gearing, made of nickel-chromium casehardened steel.

23-295. Hangars of Structural Steel. *Steel Construction Digest,* v. 4, July 1947, p. 3-7.
Illustrates and describes above application.

23-296. Silver-Clad Copper Wire. *Wire Industry,* v. 14, July 1947, p. 374.
Reviews contents of publication of the London Electric Wire Co., which deals with "Anacos" silver-clad copper in wire, strip, bars, rods, and sections, which are now available in commercial quantities.

23-297. Production Welding of Freight Cars on A. C. F. Assembly Lines. *Railway Age,* v. 123, Aug. 2, 1947, p. 34-35.
Procedures and equipment used by American Car & Foundry Co., at Berwick, Pa.

23-298. Lowering Production Costs of Bumpers and Springs. Howard Laurent. *Automotive Industries,* v. 97, Aug. 1, 1947, p. 24-26, 62.
What a Los Angeles parts manufacturer has done to modernize his plant for peacetime competition.

23-299. Stress-Relief Hardening of Beryllium Copper. Robert W. Carson. *Mechanical Engineering,* v. 69, Aug. 1947, p 651-654.
The process and many of the applications made possible by its use.

23-300. Applications of Engineering Parts, Materials and Processes. *Machine Design,* v. 19, Aug. 1947, p. 160.
Broaching of brake ratchets; use of strain gages to determine rolling mill pressures; and use of lead casing for fan handling H_2SO_4 vapors.

23-301. Production of Magnesium Alloy Castings; Some Commercial Applications. (Concluded.) G. B. Partridge. *Metallurgia,* v. 36, July 1947, p. 125-132.
Some factors influencing the use of magnesium alloy castings in general engineering. Cost and design characteristics.

23-302. Aluminum Foil—Foe of Condensation. Alexander Schwartz. *Insulation,* v. 5, July 1947, p. 10-15.
Application to building construction.

23-303. Magnesium Alloys; Their Value in Engineering Applications. F. A. Fox. *Metal Industry,* v. 71, July 25, 1947, p. 63-66; Aug. 1, 1947, p. 86-88, 90.
Properties which render them suitable for peacetime commercial uses.

23-304. Finds Metal Cheaper Than Fabric in Manufacturing Personal Plane. *SAE Journal,* v. 55, Aug. 1947, p. 98, 100.
A cost comparison. (Based on "Comparison of Use of Mixed Structural Materials and Fabric Covering to All-Metal Construction for Personal Aircraft from a Manufacturing Viewpoint," by Walter C. Jamouneau.)

23-305. Ring Gears Formed From Steel Bar Stock. Kenneth Rose. *Materials & Methods,* v. 26, Aug. 1947, p. 74-77.
Starter ring gears made by a new series of steps with a number of manufacturing economies.

23-306. Magnesium Replaces Fabric for Aircraft Control Surfaces. R. E. Saunders. *Materials & Methods,* v. 26, Aug. 1947, p. 88-92.
A change to sheet magnesium resulted in greater strength, fewer parts, less weight, lower tooling costs and a worthwhile saving in labor.

23-307. Porcelain Enameled Moldings for All-Steel Poster Panels. H. H. Wineburgh. *Finish,* v. 4, Aug. 1947, p. 19-20, 52.
Cooperative development of Outdoor Advertising Assoc. of America offers new outlet for porcelain enamel.

23-308. Fabrication and Welding of Oil-Fired Water Heaters. W. R. Persons. *Machinery,* v. 53, Aug. 1947, p. 138-139.
Procedures and equipment used by Hoosier Industries, Inc., LaPorte, Ind.

23-309. A Gagemaker's Ten-Station Die. Al Morency. *Tool & Die Journal,* v. 13, Aug. 1947, p. 67-68.
Operation and applications of above die as an example of trend toward the building of complex mass-production dies by gagemakers.

23-310. Metallurgical Considerations of Gas Turbines. N. L. Mochel. *Transactions of the A.S.M.E.,* v. 69, Aug. 1947, p. 561-568; discussion, p. 568.

Testing methods and equipment. The design and application of materials to specific hot parts of gas turbines.

23-311. Materials for Power Gas Turbines. C. T. Evans, Jr. *Transactions of the A.S.M.E.*, v. 69, Aug. 1947, p. 601-608.
Materials used in the construction of the first power gas turbine built by Elliott Co. and reasons for selection.

23-312. Die Castings as Inserts. *Die Castings,* v. 5, Aug. 1947, p. 17, 37-39.
Some of the factors in molding a plastic shape over a die-cast insert.

23-313. Duplicator Redesign. Joseph Palma, Jr. and Max E. Toby. *Die Castings,* v. 5, Aug. 1947, p. 18-20, 39-43.
Many small machine assemblies in Niagara stencil duplicator have been replaced by die castings to eliminate wasteful handwork.

23-314. Following a Successful Pattern. *Die Castings,* v. 5, Aug. 1947, p. 21, 43-45.
Application of aluminum-alloy die castings to cloth cutting machine.

23-315. Focus on Performance. Milford B. Moore. *Die Castings,* v. 5, Aug. 1947, p. 32-37.
Use of die castings to replace fabricated or wooden parts in new line of cameras.

23-316. Fabricating Methods for Rail Steel. *American Machinist,* v. 91, Aug. 14, 1947, p. 147.
Punching, shearing, and arc welding.

23-317. New Developments in Tungsten Carbide. A. R. Zapp. *Wire and Wire Products,* v. 22, Aug. 1947, p. 591-593, 612-614.

23-318. Railroads Demand More Strength and Less Weight. Pierre Champion. *Industry and Welding,* v. 20, Aug. 1947, p. 34, 36.
Fabrication of welded steel parts and assemblies for railroad cars.

23-319. Comptoirs de Bars en Aluminium. (Aluminum Bar Counters.) Guy Bourrague. *Revue de l'Aluminium,* v. 24, no. 133, May 1947, p. 171-177.
The use of aluminum in various types of counters and sinks; and details of their construction.

23-320. Un Moteur De 3500 CV: Le Rolls-Royce "Eagle". (A 3500 Hp. Engine: The Rolls-Royce "Eagle".) Leonce Keuleyan. *Revue de l'Aluminium,* v. 24. no. 133, May 1947, p. 178-182.
Construction and use of aluminum in this engine.

23-321. Ingenious Technique for Biggest Inch Pipe Fabrication. Gilbert M. Wilson. *World Oil,* v. 126, Aug. 18, 1947, p. 78-82.
The fabrication process—continuous welding of the longitudinal seams; hydraulic expansion of the welded pipe sections to produce a thinner walled, yet higher yield strength pipe.

23-322. A New Mold Development for Low Pressure Technique. William Schack. *Plastics,* v. 7, Aug. 1947, p. 54, 70.
Low-cost aluminum dies permit production of intricate designs with close tolerances, and needing minimum machine work.

23-323. Straight-Line Production Increases Product Output. *Production Engineering & Management,* v. 20, Aug. 1947, p. 64-72.
Equipment and procedures used in production of refrigerators.

23-324. Production Pipe Bending. L. G. Burnard. *Aircraft Production,* v. 9, Aug. 1947, p. 298-300.
Space limitations in an aircraft necessitate a large number of bends despite efforts to clean and straighten up the pipe runs. Power bending machine, construction, and operation; standardization of pipe runs.

23-325. Light Alloys in the Mining Industry. A. Roberts. *Mine & Quarry Engineering,* Aug. 1947, p. 229-235.
Use of light alloys in skips and cages in Great Britain mine trucks. Successful use has been made of light alloys for haulage shackles, props, bars, shovels, and other equipment, while experiments have been carried out with conveyer troughing made of light alloy.

23-326. Low-Cost Quantity Production. C. W. S. Parsons. *Western Metals,* v. 5, Aug. 1947, p. 13-14.
A study of western metalworking shops with particular reference to the Ford parts program.

23-327. Engraved Magnesium Plates Cut Printing Costs. Wm. J. Higgins. *Modern Metals,* v. 3, Aug. 1947, p. 28-29.
A new development for printing newspapers. The new process offers possibilities of saving 50% in the production costs of a newspaper.

23-328. A Metal Texturizing Process That Combines Strength With Beauty Makes Its Bid for Postwar Attention. Eugene W. Nelson. *Western Metals,* v 5, 1947, p. 23-24.
"Rigidized metal" has strength or stiffness in all directions and is the product of a special patented process which creates a "clear-through" pattern in nearly any flat rolled metal, giving the sheets a third dimension.

23-329. Developments in the Use of Aluminum for Food Containers. Rene Chevillotte. *Sheet Metal Industries,* v. 24, Aug. 1947, p. 1583-1586, 1590.
Effect on health; forming of cans; types of cans; behavior of cans toward corrosive action of food products.

23-330. Tipping Coal-Cutter Picks With "Hardmetal". L. Wachtel. *Colliery Guardian,* v. 175, Aug. 1, 1947, p. 165-168.
Benefits, techniques, and costs of tipping coal-cutter picks with an extremely hard and abrasion resistant medium.

23-331. Interest Is Renewed in Magnesium as Metal for Photo-Engraving. *Editor & Publisher,* v. 80, Aug. 9, 1947, p. 58.
Relative costs and other advantages and disadvantages.

23-332. Crosley Builds a 59-Lb. Engine. Chester Ricker. *American Machinist,* v. 91, Aug. 28, 1947, p. 85-89.
How 120 lightweight parts are brazed together at 150 points to build the Crosley engine with minimum machining. The 4-cyclinder, overhead-valve engine is unique in having an all-steel copper-brazed cylinder block mounted on a permanent-molded crankcase of aluminum alloy.

23-333. In the Service of Science. *Light Metals,* v. 10, Aug. 1947, p. 408-417.
The uses of aluminum and magnesium in the construction of scientific and technical apparatus for use in the laboratory and the field. Low inertia, adequate strength; water distillation; hydrogen peroxide; fabrication and finishing characteristics of aluminum-base alloys; optical instruments; front-surfaced reflectors; other applications of evaporated aluminum films. (To be continued.)

23-334. Light Alloys in the Internal Combustion Engine. *Light Metals,* v. 10, Aug. 1947, p. 425-430. (Continued.)
Factors influencing the use of light alloys for cylinder heads, cylinders, blocks and crankcases. The importance of weight reduction and high conductivity of heat. (To be continued.)

23-335. The Production of British Clearing Heavy Presses. *Machinery (London),* v. 71, Aug. 7, 1947, p. 143-149.
Methods employed at the Works of Vickers Armstrong, Ltd., Newcastle-on-Tyne, England.

23-336. Aluminum in Rolling Stock. *Locomotive Magazine and Railway Carriage and Wagon Review,* v. 53, June 14, 1947, p. 89.
Use of aluminum for various parts.

23-337. Minerals for Chemical and Allied Industries. Sydney J. Johnstone. *Industrial Chemist,* v. 23, Aug. 1947, p. 529-537.
Magnesium metal, magnesia refractories; dolomite. (To be continued.)

23-338. Mass Producing Hollow Metal Door Frames. *Iron Age,* v. 160, Sept. 4, 1947, p. 71.
Methods and equipment used by Diebold, Inc., Canton, Ohio.

23-339. Ferguson Tractor Production by the Standard Motor Co., Ltd. *Machinery (London),* v. 71, Aug. 14, 1947, p. 171-182.
Production procedures and equipment.

23-340. Continuous Lining of Corrugated Steel Waterproofs Reconstructed Tunnel. John F. Laboon. *Engineering News-Record,* v. 139, Sept. 4, 1947, p. 34-36.
Effectiveness of continuous corrugated sheet-metal lining in producing a watertight condition under extremely adverse conditions.

23-341. Aluminex Roof Glazing. *Aluminium and the Non-Ferrous Review,* v. 12, April-June 1947, p. 36-37.
New type of aluminum window frame for skylights.

23-342. Copper and Its Alloys. E. Voce. *Metal Industry,* v. 71, Aug. 29, 1947, p. 163-166.
Applications in marine and allied engineering.

23-343. Aluminum Alloys. E. G. West. *Metal Industry,* v. 71, Aug. 29, 1947, p. 173-176.
The utilization of light metal for marine purposes.

23-344. Standardization Accelerates Turbine Output. *Steel,* v. 121, Sept. 8, 1947, p. 80-81.
Steps in production of turbines at Fitchburg, Mass., plant of General Electric are illustrated.

23-345. New Expediting Techniques Proved in XB-48 Production. Irving Stone. *Aviation Week,* v. 47, Sept. 8, 1947, p. 26, 29-30.
Fabrication techniques in production of experimental jet bomber by Glenn L. Martin Co.

23-346. Gas Turbines. H. R. Zschokke and K. H. Niehus. *Iron and Steel,* v. 20, Aug. 1947, p. 398-400; discussion, p. 407-409.
Requirements of a suitable steel for turbines for varied applications. Corrosion of the combustion chamber.

23-347. Metallized Circuits Reduce Wiring Costs. John T. Collier. *Electrical Manufacturing,* v. 40, Sept. 1947, p. 116, 118.
Production of Spraywire circuits.

23-348. Aluminum Foil Makes Ideal Honeycomb. *Aluminum Bulletin,* v. 1, Sept. 1947, p. 3.
Use of honeycomb paneling as a packaging, insulating, and labeling material.

23-349. An Old Business Goes Modern. Hannibal Coons. *Steelways,* Sept. 1947, p. 1-5.
Applications of stainless and other steels in the wine industry.

23-350. **The Miracle of Steel and Penicillin.** Helen Worden. *Steelways,* Sept. 1947, p. 9-12.
Uses of steel in manufacture of penicillin.

23-351. **These Wheels Carry a Pedigree.** *Steelways,* Sept. 1947, p. 25-26.
Manufacture of wrought steel railroad car wheels.

23-352. **Spray-Installing Electrical Circuits.** John T. Collier. *Steel,* v. 121, Sept. 15, 1947, p. 96, 110.
Conventional wire—fed into guns—is converted into flat conductive strips embedded in dielectric panels.

23-353. **Miracle of Metallurgy Sires New Timepiece Accuracy.** *Inco Magazine,* v. 21, Summer 1947, p. 4-7.
Manufacture of hairsprings for Hamilton watches from "Elinvar Extra" alloy (41 to 43% Ni, 2.2 to 2.6% Ti, 5.1 to 5.7% Cr, 0.06% C, 0.3 to 0.6% Mn, 0.3 to 0.6% Si, 0.4 to 0.8% Al, 0.04% P, 0.04% S, and balance Fe).

23-354. **New Tubing Can Cut Costs Between 20% and 65%.** *Inco Magazine,* v 21, Summer 1947, p. 17.
Spiralock tubing can be custom-made to a variety of sizes and shapes without extra cost. It is made from cold rolled metal strip by spiral-forming the strip into tubular shapes.

23-355. **Corrosion Eliminated Through Use of Lectro-Clad Pipe.** S. G. Bart. *Paper Mill News,* v. 70, Aug. 23, 1947, p. 78-80, 90.
Lectro-clad pipe is nickel-lined pipe developed to take the place of nickel or stainless steel. Properties, applications, and fabrication procedures, with special reference to its use in the pulp and paper industry.

23-356. **Cast Bolts for Pipe Joints.** C. K. Donoho. *Mechanical Engineering,* v. 69, Sept. 1947, p. 739-742.
Mass production of bolts by the use of metal molds and short cycle annealing. Experimental results show satisfactory mechanical and corrosion resistant properties. An austenitic malleable bolt with unusual strength, ductility, and corrosion resistance has also been developed for special services. (Presented at semi-annual A.S.M.E. meeting, Chicago, June 16-19, 1947.)

23-357. **Product Design for a Crowded Market.** A. F. Fukal. *Die Castings,* v. 5, Sept. 1947, p. 19, 32, 34.
An improved cigarette lighter utilizing aluminum die castings.

23-358. **Measuring the Potential.** C. A. Blakeslee. *Die Castings,* v. 5, Sept. 1947, p. 20-24, 26, 28-29, 41-45.
Use of die castings in Bristol recording and controlling potentiometers. 32 complex types of instruments can be constructed from two basic assemblies.

23-359. **Die-Cast Rotors.** J. J. DeWindt and G. L. Ringland. *Die Castings,* v. 5, Sept. 1947, p. 30-31, 46-47.
Manufacture of aluminum die-cast rotors.

23-360. **Light Weight for Heavy Duty.** *Die Castings,* v. 5, Sept. 1947, p. 36-40.
Use of aluminum die castings for chain hoists.

23-361. **Use of Die Castings Grows With Development of Better Production Equipment.** *Steel,* v. 121, Sept. 22, 1947, p. 95.
Trends and the development of new applications.

23-362. **Lightweight All-Welded Steel Trailer for Transporting Heavy Construction Equipment.** C. W. Lytton. *Welding Journal,* v. 26, Sept. 1947, p. 770.

23-363. **All-Welded Prefabricated Sandwich Shops Shipped Completely Assembled Anywhere in the United States.** R. H. Davies. *Welding Journal,* v. 26, Sept. 1947, p. 788-789.
Manufactured by Valentine Industries, Inc., Wichita, Kan.

23-364. **Welded Steel Container.** T. M. Fallon. *Welding Journal,* v. 26, Sept. 1947, p. 793.
A 277-cu.ft. welded steel (interlocking) weathertight shipping container designed to carry loads up to 12,000 lb., developed by Dravo Corp., Pittsburgh. It is especially designed for marine use.

23-365. **Nickel in Marine Engineering.** A. E. Hanson *Metal Industry,* v. 71, Aug. 29, 1947, p. 167-170; Sept. 5, 1947, p 207-208.
Miscellaneous applications.

23-366. **The Aerosudest SE-2010 in Production.** *Aircraft Engineering,* v. 19, Aug. 1947, p. 265-271, 276.
Procedures and equipment used in construction of French plane.

23-367. **Television Comes of Age.** *American Machinist,* v. 91, Sept. 25, 1947, p 99-101.
Adaptation of assembly-line production by RCA to manufacture of television-receiving sets.

23-368. **New Westinghouse "Life-Line" Motors Draw Upon Press Industry in Meeting Production Requirements.** Floyd McKnight. *Modern Industrial Press,* v 9, Sept. 1947, p. 40, 42, 46, 48, 60.
Procedures and equipment; presses and related machinery.

23-369. **Efficient Production of Metal Window Frames and Related Hardware.** Walter Rudolph. *Modern Industrial Press,* v. 9, Sept. 1947, p. 26, 30, 32, 34, 36.
Procedures and equipment used by Johnson Metal Products Co., Erie, Pa.

23-370. **The Gas Turbine Power Plant. Part VI.** John I. Yellott. *Power Plant*

Engineering, v. 51, Sept. 1947, p. 113-114, 116, 118, 120, 122, 124.
Gas turbine materials including properties of many important high-temperature alloys. The coal-fired gas turbine—construction, operation, and details of the present experimental units. 10 ref.

23-371. Thermic Ray Comes to Cooking. *Western Machinery and Steel World,* v. 38, Sept. 1947, p. 100-102.
Equipment and procedures used in manufacture of stainless steel pots and pans by Norris Stamping and Mfg. Co., Los Angeles.

23-372. Making Electrical Controls. *Western Machinery and Steel World,* v. 38, Sept. 1947, p. 103-105.
Procedures and equipment used by Square D Co. in Los Angeles.

23-373. What to Look for in Precision Ground Toolsteel. H. J. Chamberland. *Western Machinery and Steel World,* v 38, Sept. 1947, p. 106-107, 137.
Manufacture, selection, and applications.

23-374. Sleeping Beauty of Industry. Edwin Laird Cady. *Scientific American,* v 177, Oct. 1947, p. 154-156.
Miscellaneous industrial applications of silver.

23-375. Cast Bolts for Pipe Joints. C. K. Donoho. *American Foundryman,* v. 12, Sept. 1947, p. 24-27, 62.
Mass production of bolts by the use of metal molds and short-cycle annealing. Experimental results show satisfactory mechanical and corrosion resistant properties. An austenitic malleable bolt with unusual strength, ductility, and corrosion resistance has also been developed for special service. (Presented at Semi-Annual A.S.M.E. meeting, Chicago, June 16-19, 1947.)

23-376. The Green Light Is On in the Manufacture of Home Appliances at Pressed Steel Car Co., Inc. *Better Enameling,* v. 18, Sept. 1947, p. 8-14.
Procedures and equipment used in manufacture of pressed steel products, with emphasis on their pickling and finishing.

23-377. The Manufacture of Hollow Drill Steel in Australia. E. B. Sutters. *B.H.P. Review,* v. 24, June 1947, p. 14-16.
Steels used and production methods required in the making of hollow mining drills, together with the history of this project's development in Australia.

23-378. Assault Bridge in Magnesium. S. K. Ghaswala. *Light Metals,* v. 10, Sept. 1947, p. 434-436.
Development, construction, and assembly of an emergency bridge using ultralight alloys throughout.

23-379. In the Service of Science. (Continued.) *Light Metals,* v. 10, Sept. 1947, p. 443-448.
Physical properties of aluminum in relationship to its laboratory uses. (To be continued.)

23-380. Light Alloys in the Internal-Combustion Engine. (Continued.) *Light Metals,* v. 10, Sept. 1947, p. 450-455; Oct. 1947, p. 542-548.
The theory and practice of the use of aluminum and magnesium for connecting rods, bearings, and pistons. Clearances; piston alloys; piston design. (To be continued.)

23-381. Aluminum and Magnesium at the Engineering and Marine Exhibition. *Light Metals,* v. 10, Sept. 1947, p. 456-492.
A large number of applications shown at British Engineering and Marine Exhibition.

23-382. Selecting, Testing and Fabricating Spring Materials. F. P. Zimmerli. *Materials & Methods,* v. 26, Sept. 1947. p. 74-79.
Adapted from paper presented at Summer Meeting, Society of Automotive Engineers, June 1-6, 1947.

23-383. The Making of a Roll. *Blast Furnace and Steel Plant,* v. 35, Sept. 1947, p. 1096-1097.
A picture story of the manufacture of rolling-mill rolls.

23-384. Tri-Metal Offset Plate Promises Longer Runs. *American Paper Converter,* v. 21, Sept. 1947, p. 17.
Plate recently announced by International Printing Ink Research Lab., New York. It is composed of three layers of metal—chromium, copper and a base metal. The latter was originally steel but is now made of zinc. (See also annotation 23-385 for other source.)

23-385. Tri-Metal Offset Plate. *American Pressman,* Sept. 1947, p. 34.
(See annotation 23-384.)

23-386. Shielding Industrial Electronic Generators. R. A Whiteman. *Radio-Electronic Engineering* (bound with *Radio News,* v. 38), v. 9, Sept. 1947, p 8-10, 25.
Methods for avoiding excessive interference to radio facilities from industrial radio-frequency generators The three materials used are copper. aluminum, and iron. Depth of penetration vs. frequency is charted for these metals.

23-387. Sheet Metal Buildings on Farms. Walter Alwyn-Schmidt. *Sheet Metal Worker,* v. 38, Sept. 1947, p. 64-66.

23-388. Making a Tubular Steel Chair. *Sheet Metal Worker,* v. 38, Sept. 1947, p. 67, 123.
Procedures.

23-389. **The Production of Fuel Injection Equipment.** *Machinery (London),* v 71, Sept. 11, 1947, p. 283-290.

Methods used by British concern.

23-390. **Sewing Machine Manufacture.** T. R. Gupta. *Machinery (London),* v 71, Sept. 11, 1947, p. 296-298.

Methods and equipment used by Jay Engineering Works, Calcutta.

23-391. **Aluminum Moves in on New Products.** *Modern Industry,* v. 14, Sept. 15, 1947, p. 133.

"Honeycomb" sandwich cores have miscellaneous applications.

23-392. **Springs Carry the Load.** *Modern Machine Shop,* v. 20, Oct. 1947, p. 198-199.

Production of springs for railroad rolling stock by Crucible Steel Company of America.

23-393. **Tools for Oil.** C. H. Elliott. *Modern Machine Shop,* v. 20, Oct. 1947, p 124-130, 132, 134, 136, 138, 140.

Some of the operations used in the making of oil-well drills at Reed Roller Bit Co., Houston, Tex.

23-394. **A Radically Different Method of Building Motor Coaches.** Leland A. Bryant. *Automotive Industries,* v. 97, Oct. 1, 1947, p. 24-28.

Consolidated-Vultee's use of master tooling dock and geometric mastering system for mass production of heretofore custom-built product at Nashville plant.

23-395. **Independent Units Protect Automatic Transfer Lines.** Joseph Geschelin. *Automotive Industries,* v. 97, Oct. 1, 1947, p. 30-34, 64.

Buick's cylinder-head setup; transmission-case line at Borg-Warner's Detroit gear division featuring oil-gear valve guide press, Allis-Chalmers induction heating machine, Michigan Tool shear-speed gear shaper, and Baush five-station machine.

23-396. **Pontiac's Expanded Facilities.** Joseph Geschelin. *Automotive Industries,* v. 97, Oct. 1, 1947, p. 42-44, 76.

Major improvements include one of the largest fully automatic chromium-plating plants, new and enlarged cupolas to increase foundry pouring capacity 50% and a huge parts warehouse.

23-397. **Cold Wave on Wheels.** *Steel Horizons,* v. 9, no. 4, 1947, p. 12-13.

Stainless-steel refrigerator car.

23-398. **A Review of the "Alcrete" House.** *Light Metal Age,* v. 6, Sept. 1947, p. 12-13.

Aluminum and concrete are used in the construction of one and two-room houses in Great Britain.

23-399. **Aluminum Building Wire.** E. W. Renfree. *Modern Metals,* v. 3, Sept. 1947, p. 14-15.

Properties and installation methods for aluminum electrical conductors for interior wiring of buildings.

23-400. **Army Ordnance Turns to Magnesium.** C. H. Corey. *Modern Metals,* v. 3, Sept. 1947, p. 16-18.

Some applications of magnesium for military equipment.

23-401. **New Projector and Protectochrome Mounts.** *Modern Metals,* v. 3, Sept. 1947, p. 20-21.

Photographic slide projector utilizes aluminum castings so effectively that several parts are combined in a single casting.

23-402. **Esecution d'Un Creuset en Fonte Speciale Pour Métaux Precieux. (Manufacture of a Special Cast Iron Crucible for Precious Metals.)** Pierre Simon. *Fonderie,* July 1947, p. 731-734.

A crucible capable of withstanding external heat of 600° and internal heat of 300° for a mixture of platinum, gold, or silver with concentrated sulphuric acid was desired. Size, shape, composition of the cast iron and special precautions in manufacture of the crucible.

23-403. **Petroleum Steel Needs up Sharply.** Warren L. Baker. *World Oil,* v. 127, Oct. 1947, p. 60-62.

A statistical presentation.

23-404. **Plain Facts.** *Die Castings,* v. 5, Oct. 1947, p. 24, 35.

How concentricity of planer and sander heads is held to a close tolerance by die casting in aluminum with the shank as an insert. An auxiliary drill-press table is also die cast in aluminum, gaining flatness and rigidity.

23-405. **New Die Steel for the Die Casting Industry.** W. George Johnson. *Die Castings,* v 5, Oct. 1947, p. 26, 28, 30.

Properties and applications of "PH No. 2"—a product of Crucible Steel Co. of America. (Composition not given.)

23-406. **A Picture of Health.** *Die Castings,* v. 5, Oct. 1947, p. 32-33.

How a Si-Al alloy is used to die cast three components of X-ray camera made by Fairchild Camera and Instrument Corp.

23-407. **Design of a Scientific Instrument.** *Die Castings,* v. 5, Oct. 1947, p. 36-41.

Zinc and aluminum die-cast design of hemoglobinometer used by physicians for blood analysis.

23-408. **New Field for Stampings Opened by Pressed Metal Pipe Fittings.** *Production Engineering & Management,* v. 20, Oct. 1947, p. 92-93.

Production and advantages of various shapes such as 45 and 90° ells, tees, and unions.

23-409. Car Builders Turn to High Tensile Steel. Alvin Gaertner. *Production Engineering & Management,* v. 20, Oct. 1947, p. 94, 102.

New trend at Fisher Body Corp., Hudson Motor Car Co., and Kaiser-Frazer is result of alloy steel shortages when car production was resumed.

23-410. Stainless Steel Piping; Why and Where to Use It. J. D. Mattimore. *Heating, Piping & Air Conditioning,* v. 19, Oct. 1947, p. 81-83.

Reasons for the use of stainless steel in different applications and the standardization of Types 304, 347, and 316 which are said to meet the needs of 95% of industry.

23-411. Diesel-Electric Railroad Motive Power. L. E. Simon. *Metal Progress,* v. 52, Oct. 1947, p. 625-628.

Procedures and equipment for fabrication at Electro-Motive Div., General Motors Corp., La Grange, Ill.

23-412. Metallurgical Progress in the Valve, Fitting and Piping Industry. J. J. Kanter. *Metal Progress,* v. 52, Oct. 1947, p. 629-631.

Important advances in Crane Co.'s foundries during the past 30 years.

23-413. Expansion Fitting With Liquid Nitrogen. Charles H. Wick. *Machinery,* v. 54, Oct. 1947, p. 156-158.

Thermal expansion and contraction of different metals at different temperatures, and amount of nitrogen required per pound of different metals

23-414. A New Method of Making Electric Connectors. H. T. Thompson. *Tool Engineer,* v. 19, Oct. 1947, p. 50.

How progressive die reduces waste, and improves product and production

23-415. Production Time Cut by Arc Welding Thin Tubing. *American Machinist,* v. 91, Oct. 9, 1947, p. 94-95.

Procedures and equipment for this process at Consolidated-Vultee Aircraft Corp.

23-416. Press-Fit Tolerances Maintained in Following Production Line Techniques to Turn Out Millions of Oil Seals. *Steel,* v. 121, Oct. 13, 1947, p. 86-87, 116, 118, 121.

As accomplished by National Motor Bearing Corp.

23-417. Muffler Maker Cuts Material and Manufacturing Costs by Installing Equipment to Handle Coiled Strip. *Steel,* v. 121, Oct. 13, 1947, p. 88-89, 114.

Procedures and equipment used by Mackenzie Muffler Co., Inc., Youngstown, Ohio.

23-418. Gegoten Hardmetall als Slijtvast Materiaal. (Cast Hard Metal as Wear Resistant Material.) E. L. Baay. *Metalen,* v. 2, Sept. 1947, p. 1-6.

Uses of cast carbides. Although usually too brittle for cutting tools, it is applicable for use as inserts, liners, nozzles, in locations of excessive wear under small loads. Cast carbides are also used for hard surfacing.

23-419. New Uses for Lithium. H. Seymour. *Industrial Chemist,* v. 23, Sept. 1947, p. 590-592.

Recent applications of the metal and its compounds.

23-420. Vanadium Catalyst; Developments of Imperial Smelting Corporation. W. J. Carter. *Alloy Metals Review,* v 5, Sept. 1947, p. 2-5.

Development of its use in sulphuric acid manufacture; types and characteristics of catalysts; methods of manufacture and testing; effects of impurities.

23-421. Bimetallic Plates. J. S. Mertle. *National Lithographer,* v. 54, Sept. 1947 p. 28-29, 90.

Efforts made to produce better litho plates, using precious metals such as silver and gold. (To be continued.)

23-422. Pressure Die Casting. *Machinery Lloyd (Overseas Edition),* v. 19, Sept. 27, 1947, p. 93-95.

Advantages of the above process with examples of items produced by a British firm.

23-423. Studebaker Adds Starter Ring Gears to Its In-Plant Manufacture. P. D. Aird. *Modern Industrial "Press",* v. 9, Oct. 1947, p. 13-14.

Welding, heat treatment, and forming procedures in fabrication of the above.

23-424. Presswork Produces Over One-Third of Parts for Magic Chef Gas Range. Walter Rudolph. *Modern Industrial "Press",* v. 9, Oct. 1947, p. 18, 20, 22, 24.

Materials handling, shearing, stamping, welding, and inspection.

23-425. Production of Costume Jewelry for Motion Picture Studios. Thomas A. Dickinson. *Modern Industrial "Press",* v. 9, Oct. 1947, p. 26, 28, 44.

Forming, trimming, annealing, brazing, and finishing procedures.

23-426. Fabrication of Yoder Refrigeration Plates. Sanford Markey. *Modern Industrial "Press",* v. 9, Oct. 1947, p. 30, 34.

Above plates consist of two 16-gage cold rolled steel plates, one embossed and one flat, welded together to form a network of channels for flow of refrigerant, and providing high refrigeration efficiency. Fabrication procedures, including welding and finishing.

23-427. Aluminum Alloys. R. H. Brown and E. D. Verink, Jr. *Industrial and*

Engineering Chemistry, v. 39, Oct. 1947, p. 1198-1201.

Recent developments in the use of the above for chemical-plant construction. 37 ref.

23-428. Wrought Copper and Copper-Base Alloy. C. L. Bulow. *Industrial and Engineering Chemistry,* v. 39, Oct. 1947, p. 1204-1210.

Recent developments in their use for chemical-plant construction. 40 ref.

23-429. Iron, Mild Steels, and Low Alloy Steels. R. B. Mears and S. C. Snyder. *Industrial and Engineering Chemistry,* v. 39, Oct. 1947, p. 1219-1224.

Recent developments in their use for chemical-plant construction. 134 ref.

23-430. Lead, Tin, Zinc, and Their Alloys. George O. Hiers. *Industrial and Engineering Chemistry,* v. 39, Oct. 1947, p. 1224-1228.

Recent developments in their use for chemical-plant construction. 77 ref.

23-431. Nickel and High-Nickel Alloy. W. Z. Friend. *Industrial and Engineering Chemistry,* v. 39, Oct. 1947, p. 1228-1234.

Recent developments in their use for chemical-plant construction. 99 ref.

23-432. Stainless Steels and Other Ferrous Alloys. M. H. Brown and W. B DeLong. *Industrial and Engineering Chemistry,* v. 39, Oct. 1947, p. 1248-1254.

Recent developments in the use of the above for chemical-plant construction. 165 ref.

23-433. Coal Wagons. *Iron and Steel,* v. 20, Oct. 1947, p. 483-484.

American experience with low-alloy steels for construction of railroad coal cars.

23-434. Wrought Aluminum Sink. *Light Metals,* v. 10, Oct. 1947, p. 495-497.

Service results based on 20 months under domestic conditions.

23-435. World's Largest Door. *Light Metals,* v. 10, Oct. 1947, p. 532-535.

Details of aluminum-alloy hangar door, 65.75 ft. high, and 1045 ft. wide.

23-436. In the Service of Science. (Continued.) *Light Metals,* v. 10, Oct. 1947, p. 536-539.

The use of aluminum in recording and measuring instruments for receiving parts, dials, and reflectors. (To be concluded.)

23-437. Survey Finds: "Chrome Plating Well Suited to Piston Rings". *SAE Journal,* v. 55, Oct. 1947, p. 33-35.

Based on "Chrome Plating to Reduce Wear—A Survey of Fleet Operators' Experience", by H. O. Mathews.

23-438. Aluminum Truck Bodies Trim Operational Costs. *SAE Journal,* v. 55, Oct. 1947, p. 58-59.

Based on "Light Weight Bodies of Aluminum for Trucks". (Presented at S.A.E. National Transportation & Maintenance Meeting, Chicago, Oct. 17, 1946.)

23-439. Stainless Steel Units Boost Fleet Revenue. *SAE Journal,* v. 55, Oct. 1947, p. 60.

Advantages found to exist. (Based on "Light Steel Body Construction", by V. M. Drew, presented at S.A.E. Southern California Section, Los Angeles, April 24, 1947.)

23-440. When Parts Should Be Die Castings Rather Than Stampings. Herbert Chase. *Materials & Methods,* v. 26, Oct. 1947, p. 87-91.

Some examples where die castings have proved more economical.

23-441. The Bristol Brabazon. *Aircraft Production,* v. 9, Oct. 1947, p. 370-377.

Procedure adopted for the extremely heavy riveting of the inner wing and also the arrangement of, and some of the manufacturing problems associated with, the power-unit bays of the above plane.

23-442. Airframe Production: A Review of Wartime Manufacture by the British Aircraft Industry. Part II. Actual Production Methods and Results; Labor Efficiency and Costs; Over-All Production Costs. Eric Mensforth. *Aircraft Production,* v. 9, Oct. 1947, p. 388-395.

Comparative value of various manufacturing systems employed during the years of maximum effort both in Britain and in the U. S.

23-443. Production Planning Keynotes the Manufacture of the Quality Range. *Better Enameling,* v. 18, Oct. 1947, p. 13-18.

Plant procedures, equipment, and layout.

23-444. Light Alloy Spools and Reels. F. A. Rappleyea. *Modern Metals,* v. 3, Oct. 1947, p. 14-16.

Comparative mechanical properties of different structural metals and of spools made from them.

23-445. Aluminum Castings for Oil Burners Cut Costs. Wm. F. Klockau. *Modern Metals,* v. 3, Oct. 1947, p. 19.

Experience of Nu-Way Corp., Rock Island, Ill.

23-446. Aluminum for Rotobowling Equipment. *Modern Metals,* v. 3, Oct. 1947, p. 24-25.

Construction of balls and equipment for new game. Players use an aluminum "discharge machine" to roll an aluminum ball.

23-447. Magnesium for Textiles: Roving Spools; Wool Bins; Lay Beams. J. Walraven. *Modern Metals,* v. 3, Oct. 1947, p 29-30.

Applications to textile manufacturing.

23-448. **Aluminum Piping for Portable Irrigation Systems.** *Modern Metals,* v. 3, Oct. 1947, p. 30.

23-449. **Light Alloy Utility Service Equipment.** R. A. O'Neill. *Modern Metals,* v. 3, Oct. 1947, p. 33-34.
Use of light alloys for ladders.

23-450 **Aluminum Talk Around Detroit.** *Modern Metals,* v. 3, Oct. 1947, p. 35.
New and planned uses by Ford and Kaiser-Frazer.

23-451. **Recent Developments in Magnesium Products.** C. H. Mahoney. *Modern Metals,* v. 3, Oct. 1947, p. 36-39.
A review.

23-452. **Coach Baggage Cars Made Principally of Aluminum.** *Modern Metals,* v. 3, Oct. 1947, p. 40.

23-453. **Compressed Air Employed in Many Ways in "Convair-240" Assembly.** *Steel Processing,* v. 33, Oct. 1947, p. 606-608.
Application to miscellaneous machines.

23-454. **Pressed Metal Advances Aid Household Equipment Manufacturers.** *Steel Processing,* v. 33, Oct. 1947, p. 614-617.
Applications to miscellaneous products.

23-455. **Porcelain Enameled Structures—An Engineered Product.** F. L. Meacham. *Engineering Experiment Station News (Ohio State University),* v. 19, Oct. 1947, p. 13-16.
Applications.

23-456. **Bimetallic Plates. Part IV.** J. S Mertle. *National Lithographer,* v. 54, Oct. 1947, p. 34-35.
Some of the more recent attempts to produce a better plate for lithography.

23-457. **Aluminum Wave Guides for Lightweight Communications Equipment.** Robert Sherman. *Communications,* v. 27, Oct. 1947, p. 28, 30-31, 34-35.
Lightweight wave guides employ new techniques in bending, brazing, and plating for aeronautical, mobile, and personal applications.

23-458. **This Mixes Things up—but Good.** *Weld* (formerly *Victor Weld*), v. 3. Oct. 1947, p. 6-8.
An all-welded, mobile, pug-mill-type concrete mixer.

23-459. **Staybolt Application and Maintenance.** *Railway Mechanical Engineer,* v. 121, Oct. 1947, p. 574-576.
Tentative specifications covering the threading of staybolts and the tapping of sheets and round nuts. Shop and enginehouse procedures are given. (Presented at Meeting of Master Boiler Makers' Association, Chicago, Sept. 15-18, 1947.)

23-460. **High-Temperature Exhaust Harnessed by Ryan.** G. E. Barton. *Western Machinery and Steel World,* v. 38, Oct. 1947, p. 66-69, 103, 111.
Fabrication of exhaust equipment for the latest Boeing, Douglas, Convair, Fairchild, Lockheed, Northrop, North American, and Martin aircraft by Ryan Aeronautical Co.

23-461. **Cranes, Bridges and Steel Structures.** Ralph G. Paul. *Western Machinery and Steel World,* v. 38, Oct. 1947, p. 74-79.
Structural steel fabrication by Judson Pacific-Murphy Corp., Emeryville, Calif.

23-462. **Automobile Wheels by Norris.** *Western Machinery and Steel World,* v. 38, Oct. 1947, p. 88-90.
Materials handling and fabrication procedures.

23-463. **Modern Box Fabrication.** Walter Rudolph. *Sheet Metal Worker,* v. 38, Oct. 1947, p. 45-46.
Procedures and equipment for fabrication of sheet metal boxes.

23-464. **Lighter Making Involves Many Metalworking Procedures.** *Steel,* v. 121, Oct. 27, 1947, p. 77-78.
156 operations which include welding, heat treating, soldering, and several special press actions are required to manufacture a cigarette lighter.

23-465. **Steels Classified for Automotive Gears.** J. R. England and O. F. Hager. *Automotive Industries,* v. 97, Nov. 1, 1947, p. 38, 74, 76.
Table summarizes the properties of most of the steel types and treatments used in present-day gear manufacture, showing their applicability to various automotive, aircraft and machine tool gears. Super Kore steels made by Carnegie-Illinois are recommended for heavy-duty service to replace certain more highly alloyed steels.

23-466 **Pullman-Standard Delivers First Box Cars Built to P-S-1 Design.** *Railway Age,* v. 123, Nov. 1, 1947, p. 33-36.
Fabrication of new 50-ton units, constructed mainly of welded open-hearth steel.

23-467. **"Harnessed" Air in the Metalworking Industry.** *Steel,* v. 121, Nov. 3, 1947, p. 94-98, 100, 102, 121-122.
From Compressed Air Handbook, Compressed Air & Gas Institute, New York.

23-468. **16-Ton Mineral Wagons; L.M.S. Railway.** *Engineering,* v. 164, Oct. 17, 1947, p. 367-368, 372.
All-steel construction and assembly by British firm.

23-469. **Application Tables to Guide in the Selection of Materials. Part I.** Zola Fox. *Product Engineering,* v. 18, Nov. 1947, p. 165, 167, 169.

Materials and applications listed are those used principally in machine design. Wrought carbon steels, stainless steels, alloy steels, copper and nickel alloys, and aluminum alloys covered.

23-470. Build Your Truck From Standard Aluminum Parts. *Food Industries,* v. 19, Nov. 1947, p. 102-104.

Fabrication of individual styles of van-type truck bodies is made possible by use of standard sides and doors of varying lengths, heights, and designs.

23-471. Tools for Plastics Fabrication. *British Plastics,* v. 19, Oct. 1947, p. 465-466.

Use of tungsten-carbide-tipped saws and cutters.

23-472. Elektron Molding Boxes. *Foundry Trade Journal,* v. 83, Oct. 16, 1947, p. 127-128.

Boxes are made of magnesium alloy; their advantages, design, and manufacture.

23-473. Minerals for Chemical and Allied Industries. A Review of Sources, Uses and Specifications—Part XIV. Sydney J. Johnstone. *Industrial Chemist,* v. 23, Oct. 1947, p. 681-687.

Mica, vermiculite, and molybdenum and its compounds. (To be continued.)

23-474. Stainless Steel Piping; Selection of Pipe Joints. J. D. Mattimore. *Heating, Piping & Air Conditioning,* v. 19, Nov. 1947, p. 84-87.

Selecting types of joints for maintaining sanitary conditions, avoiding fluid contamination, and reducing the possibilities of crevice-type corrosion.

23-475. Gasification of Lignite and Subbituminous Coal; Progress Report for 1945-46. V. F. Parry and others. *Bureau of Mines R. I. 4128,* Sept. 1947, 69 p.

Design, construction, and operation of two pilot plants with externally heated retorts for gasification of low-rank fuels. Emphasizes the behavior of the mild steel retort clad with ⅛-in. sheets of 28% Cr steel.

23-476. Means of Improving Microstructural Quality of Piston Rings. N. E. Chernobaeva. *Industrial Power (U.S.S.R.),* v. 4, Sept. 1947, p. 11-12. (In Russian.)

In the manufacture of cast-iron piston rings, rejections due to unsatisfactory microstructures were materially reduced by increasing the radial thickness of the rings 1.0 to 1.2 mm. so that the unsatisfactory structure was limited to the part of the ring removed during machining.

23-477. Aluminum for Warm Air Ducts. *Fueloil & Oil Heat,* v. 6, Nov. 1947, p. 72-74, 136, 139.

Properties and advantages; data for the installer.

23-478. Les Postes Récepteurs de T. S. F. (Radio Receivers of T. S. F.) Jacques Piget. *Revue de l'Aluminium,* v. 24, Sept. 1947, p. 265-269.

Use of aluminum parts in radio sets.

23-479. L'Aluminium au Theatre. (Aluminum in the Theater.) *Revue de l'Aluminium,* v. 24, Sept. 1947, p. 270-274.

Miscellaneous applications.

23-480. Urbanisme et Habitation. (Urban Housing Construction.) Maurice Victor. *Revue de l'Aluminium,* v. 24, Sept. 1947, p. 275-286.

Use of aluminum in construction of houses in France.

23-481. Magnesium in Germany, 1939-45. F. A. Fox. *Metal Treatment,* v. 14, Autumn 1947, p. 169-174.

Some of the principal wartime developments in magnesium technology discovered by Allied investigators. Improvements in the electrolytic process; development of new alloys; ordinary casting; pressure die-casting; casting for wrought fabrications; extrusion; rolling; forging; welding; protection; and applications.

23-482. The Manufacture and Use of Rubber and Plastic Mill Rolls. K. F. Schmidt. *United Effort,* v. 27, Nov. 1947, p. 3-6.

23-483. Compressed Air Helps to Make Better Cables. *Wire and Wire Products,* v 22, Nov. 1947, p. 896-897.

Use of compressed air to operate various machinery in cable fabrication.

23-484. Radiant Heat With Copper Tubing. Part II. Fabrication of Heating Coils. D. L. Mills and L. J. LaTart. *Heating and Ventilating,* v. 44, Nov. 1947, p. 95-98.

Radiant-heating installation in the metallurgical laboratory of Revere Copper and Brass will be used as a source of fabrication, performance, and heat-transfer data, as well as serving the laboratory building as a heating system. Fabrication techniques.

23-485 Practical Problems of Light Presswork Production. (Continued.) J. A. Grainger. *Sheet Metal Industries,* v. 24, Nov. 1947, p. 2214-2216.

Trimming, beading, guillotine cutting. (To be continued.)

23-486. Die Castings That Cost Less Than Screw Machine Products. Herbert Chase. *Materials & Methods,* v. 26, Nov. 1947, p. 90-94.

While tooling costs for die casting of small parts often run higher than for screw machines, they are frequently offset by large savings in scrap and by decreased cost of secondary operations.

23-487. Wire Braiding and Precision Wire Braiding. G. Wightman. *Wire and Wire Products,* v. 22, Nov. 1947, p. 888-890, 926.

Some British machines for fabrication of twisted and braided cables.

23-488. Broader Application for Standard Hole Punching Units. *Tool Engineer,* v. 19, Nov. 1947, p. 32.

Extension of application of standard hole punching and notching units, by mounting in press brakes to provide considerably faster setups and easier and less expensive storage of patterns in addition to increased output and reduced downtime.

23-489. Design of a Gas Heater. *Die Castings,* v. 5, Nov. 1947, p. 21, 39-42.

Gas heater made from aluminum die castings.

23-490. The Use of Die Castings in Product Redesign. *Die Castings,* v. 5, Nov. 1947, p. 22-26, 28, 30-35, 42.

Survey of over 1600 plants in seven general fields of manufacture to determine more specifically the part which die castings are playing in current product redesign.

23-491. Experiences With Panel Construction. L. F. Booth. *Engineering News-Record,* v. 139, Nov. 13, 1947, p. 136-139.

Use of large metal panels for floors and walls in large buildings. Floors are composed of cellular steel plank and exterior walls of insulated, steel-and-aluminum panels. Interior partitions of asbestos-cement slabs clipped to steel studs are used in the laboratory.

23-492. Continental Rearranges Production Facilities for Smoother Operation. Joseph Geschelin. *Automotive Industries,* v. 97, Nov. 15, 1947, p. 34-35, 74.

Equipment and procedures.

23-493. What Size Is Hot Work? L. W. Macomber and C. N. Weiler. *American Machinist,* v. 91, Nov. 20, 1947, p. 101-104.

Effects of variations in room and operating temperatures on the problem of making close fits with aluminum and magnesium. Procedures for compensating for these variations.

23-494. Automatic Welding of Vital Parts for Coal Loader. C. W. Lytton. *Mechanization,* v. 11, Oct. 1947, p. 91.

Use of automatic arc welding to double daily production of parts with positive alignment of various members, and to cut labor cost.

23-495. Gravity and Pressure Die Castings Used in the Minilift Portable Hoist. H. K. and L. C. Barton. *Machinery (London),* v. 71, Oct. 30, 1947, p. 495-498.

23-496. High-Temperature Alloys; Development for Gas Turbines. William T. Griffiths. *Metal Industry,* v. 71, Oct. 31, 1947, p. 359-362; Nov. 7, 1947, p. 379-381; Nov. 14, 1947, p. 401-403.

Condensed from paper presented to Royal Aeronautical Society, Oct. 23, 1947.

23-497. A New Plant and a New Product. *Western Machinery and Steel World,* v. 38, Nov. 1947, p. 98-101.

Design and production of heavy-duty brake mechanism called "the mountain brake" for use on trucks, buses, and heavy trailers.

23-498. All-Welded Sandwich Shops. *Sheet Metal Worker,* v. 38, Nov. 1947, p. 62-63.

Prefabricated sandwich shops of all-welded stainless steel and aluminum.

23-499. Building, Repairing and Design of Farm Machinery. Ernest J. Koop. *Welding Journal,* v. 26, Nov. 1947, p. 988-990.

Presented at 28th Annual Meeting, American Welding Society, Chicago, week of Oct. 19, 1947.

23-500. Hard Materials for Rock Bits. Part I. R. W. Adamson. *Mining Congress Journal,* v. 33, Nov. 1947, p. 38-41.

History of tungsten carbide bits; their characteristics and the research that led to their development. (To be continued.)

23-501. Photo-Engraving Being Done on Magnesium. H. E. Swayze. *Photo-Engravers Bulletin,* v. 37, Nov. 1947, p. 154-162.

The Perry-Higgins process and its utilization by a weekly newspaper. General procedures and advantages.

23-502. Cannon Electric Boosts Southland's Die Casting Output. Leslie Baird. *Western Metals,* v. 5, Nov. 1947, p. 22-23.

Procedures and equipment for manufacture of die-cast electrical parts.

23-503. Aircraft Air Compressors. J. A. Oates. *Aircraft Production,* v. 9, Nov. 1947, p. 425-429.

Production and inspection operations employed by Hymatic Engineering Co., Ltd.

23-504. Northwest Tube and Metal Fabricators Good Illustration of Diversified New Industry in Portland, Oregon. Gerald E. Stedman. *Modern Industrial "Press",* v. 9, Nov. 1947, p. 29, 32, 34.

Procedures and equipment, mainly in welding, pressing, and shearing.

23-505. Aluminum Trolley Coaches. *Modern Metals,* v. 3, Nov. 1947, p. 14-15.

23-506. Aluminum for Bars. *Modern Metals,* v. 3, Nov. 1947, p. 24-26. (Translated from *Revue de l'Aluminium.*)

French practice in use of aluminum for bars and counters.

23-507. **Railway Bogies.** *Iron and Steel,* v 20, Nov. 1947, p. 521-523.
Replacement of assemblies by steel castings.

23-508. **Drier Rolls; Characteristics of the Jacketed Steel Type.** George L. Snyder. *Iron and Steel,* v. 20, Nov. 1947, p. 528-530.
Condensed version of a paper recently presented to the American Pulp and Paper Mill Superintendents' Assoc.

23-509. **"Standing-Up to It".** *Light Metals,* v. 10, Nov. 1947, p. 551.
After 11 months' use, aluminum alloy bars did not sag or warp when used as supports for cooking utensils above the flames of a gas stove.

23-510. **Light Alloys in the Internal-Combustion Engine. (Continued.)** *Light Metals,* v. 10, Nov. 1947, p. 552-560.
Light-alloy pistons. (To be cont.)

23-511. **Behind the Door.** *Light Metals,* v. 10, Nov. 1947, p. 573-575.
Some of the aluminum castings and extruded sections used for the world's largest door (for the hangar for the British Brabazon I).

23-512. **In the Service of Science. (Concluded.)** *Light Metals,* v. 10, Nov. 1947, p. 576-580.
Some further applications of aluminum to laboratory apparatus; the possibilities of magnesium. 10 ref.

23-513. **Prefabricated Light Metal Coachwork in France.** Graham Davies. *Light Metals,* v. 10, Nov. 1947, p. 586-601.
Production of light-metal coach bodies in progress in France. Detail drawings.

23-514. **Commutators With Anodized Aluminum Insulation.** H. Blaess. *Light Metals,* v 10, Nov. 1947, p. 602-603. (Translated from *Die Technik,* v. 2, 1947, p. 247).
By a suitable modification of the commutator assembly process, mica may successfully be replaced by an alumina film.

23-515. **Some Recent Applications of Cemented Carbide.** K. R. Beardslee. *Machinery (London),* v. 71, Nov. 6, 1947, p. 507-512.

23-516. **Aluminum Coated Steel Strip.** *Machinery (London),* v. 71, Nov. 6, 1947, p. 512.
Production in Germany for use as electric cable tape, and for telephone diaphragms, flexible metallic tubing, and a variety of similar applications. (From B.I.O.S. Report No. 1467.)

23-517. **Iron and Steel and Refrigeration. No. II.** Dudley Gordon. *Engineer,* v. 184, Nov. 7, 1947, p. 430-431.
22 references.

23-518. **Construction of All-Steel Wagons on the L.N.E.R.** *Engineer,* v. 184, Nov. 7, 1947, p. 436-437.

23-519. **Versatility of High-Strength Steels.** *Steel,* v. 121, Nov. 17, 1947, p. 104.
Weight-saving possibilities through proper design and utilization. Miscellaneous applications. (Based on paper by H. Malcolm Priest before Pittsburgh section of A.S.T.M.)

23-520. **Rapid Stud Driving Fixture.** Herbert Chase. *Iron Age,* v. 160, Nov. 27, 1947, p. 74-75.
Special fixture automatically locates the radio grille of an automobile under a hopper-fed stud driver and permits the setting of up to 6000 studs a day by one operator.

23-521. **Welding Facilitates Assembly of Silicone Engine Dampers.** Joseph Geschelin. *Automotive Industries,* v. 97, Dec. 1, 1947, p. 24-25.
In a torsional-vibration damper developed by Houdaille-Hershey, a small volume of a high-viscosity silicone fluid fills the clearance between flywheel and housing. Various steps in the assembly of these devices, including the submerged-arc welding of the outer and inner edges of the cover to the housing.

23-522. **A Welded Stainless Steel Worm.** *Welder,* v. 16, July-Sept. 1947, p. 67-68
Machine used in automatic molding and wrapping of butter and margarine. One of the essential features is the stainless-steel feed screw or worm.

23-523. **Pre-Cutting of Aluminum Houses.** W. J. Granberg. *Light Metal Age,* v. 5, Nov. 1947, p. 14-16.
Procedures and equipment for cutting and forming of parts for prefabricated houses.

23-524. **Aluminum Industry in Australia.** Charles Lynch. *Light Metal Age,* v. 5, Nov. 1947, p. 18-19.
Fabrication procedures.

23-525. **Processing and Fabrication of Stainless Steel Sheet and Plate Products. Part VIII. (Continued.)** H. S. Schaufus and W. H. Braun. *Steel Processing,* v. 33, Nov. 1947, p. 681-684, 704.
Applications in various fields of industry and commerce, including architecture, food, dairy, beverage, chemical, textile, and high-temperature industries. (To be concluded.)

23-526. **Bimetallic Plates. Part V.** J. S. Mertle. *National Lithographer,* v. 54, Nov. 1947, p. 38-39.
Considers the work of A. R. Trist and William C. Huebner. (To be continued.)

23-527. **The Tri-Metal Plate: Does It Meet a Great Need of the Lithographic**

Industry? Paul Whyzmuzis. *National Lithographer,* v. 54, Nov. 1947, p. 40-41, 103-105.

The base metal (steel or zinc or an alloy of these metals) is first plated with copper, then with chromium. Advantages of this plate; results of test runs which show great durability; method of processing.

23-528. Rayon Motor: Operation in an Acid Atmosphere. C. L. Hamm and J. S. Boudreau. *Die Castings,* v. 5, Dec. 1947, p. 21, 45-46.

Application of aluminum die castings.

23-529. Die Castings in the Construction of Electric Locomotives. P. W. Thompson, C. E. Mathews, and W. J. Simpson. *Die Castings,* v. 5, Dec. 1947, p. 22-24, 39.

Use of about 400 zinc, aluminum, and copper die castings in heavy-duty transportation equipment.

23-530. Tin Die Castings in Testing Equipment. C. N. Svenson. *Die Castings,* v. 5, Dec. 1947, p. 31-32, 49.

Use of a special tin alloy developed for die casting instrument parts to give exceptional dimensional stability. This method has been chosen as the most practical method of assembling pole pieces. Composition of the alloy is not given, other than stating that it contains tin, copper, lead, and zinc.

23-531. Network Protector for Power Systems. J. T. Clenny and L. H. Sperow. *Die Castings,* v. 5, Dec. 1947, p. 36-38.

Solution of difficult fabricating problems by die casting four major parts of the G.E. network protector. Other zinc and lead-base die castings go into circuit breakers and fuses.

23-532. Unusual Tooling Expedites Midget Electric Motor Output. F. R. Schulz. *Iron Age,* v. 160, Dec. 4, 1947, p. 64-67, 140.

Use of die castings and unusual techniques for production of miniature electric motors of 0.0005 hp. weighing about 3 oz. and operating on 1½ volts. The methods require that precision be combined with ingenious methods for handling the very small parts involved. Machining operations and an unusual setup for winding the extremely small coils on the armature.

23-533. Producing Bumpers at Auto-Lite. *Iron Age,* v. 160, Dec. 4, 1947, p. 84-85.

Procedures and equipment for pressing, plating, polishing, buffing, and inspection.

23-534. Volume Fabricating Methods Increase Motor Coach Output. C. H. Hopper. *Production Engineering & Management,* v. 20, Dec. 1947, p. 51-55.

Procedures, layout, and equipment using sheet steel, structural steel, sheet aluminum, and aluminum extrusions.

23-535. Specialized Processes Effect Economies in Parts Processing. *Production Engineering & Management,* v. 20, Dec. 1947, p. 62-70.

Procedures and equipment for manufacturing Underwood typewriter.

23-536. A Description of an Australian Can-Making Plant. *Sheet Metal Industries,* v. 24, Dec. 1947, p. 2419-2424.

Methods at the Queensland Can Manufacturing Co., Ltd., including finishing procedures.

23-537. A Visit to the New Factory of Fisher and Ludlow, Ltd., by the Institute of Vitreous Enamellers. John Hooper. *Sheet Metal Industries,* v. 24, Dec. 1947, p. 2447-2450.

Miscellaneous fabrication procedures, which include manufacture of Bendix washing machines.

23-538. Engineering Economics of Magnesium. Harold A. Knight. *Materials & Methods,* v. 26, Dec. 1947, p. 61-65.

General cost advantages; prices; magnesium vs. other metals; magnesium in aircraft; light weight as a cost factor in trucks; other economical applications; future prospects.

23-539. Steel Tubing and Plate Replace Castings in Heavy-Duty Parts. Kenneth Rose. *Materials & Methods,* v. 26, Dec. 1947, p. 68-70.

How forming and welding are combined to produce light-weight, defect-free parts for tough railroad service.

23-540. When and How to Use Cast Iron. T. E. Eagan. *Materials & Methods,* v. 26, Dec. 1947, p. 71-75.

Characteristics of present-day gray iron which make it an engineering material which is selected for its ability to do a job rather than only because of cheapness, as was once the case. (Presented before joint meeting of the A.S.T.E. and A.F.A.)

23-541. Making the "Christmas Tree" Express. Charles H. Wick. *Machinery,* v. 54, Dec. 1947, p. 147, 154.

Production of pressed and die-cast metal and plastic toy trains on a mass production basis by Lionel Corp.

23-542. Modern Machines Speed Production at Richmond Pump Plant. Ralph G. Paul. *Western Machinery and Steel World,* v. 38, Dec. 1947, p. 68-71, 101-103.

Operating principles of the injector-type "jet-pump" and how it is produced.

23-543. Magnesium Armor. Paul R. Burt. *Western Machinery and Steel World,* v. 38, Dec. 1947, p. 72-75, 104.

Production of suit of armor for actor in film which enacts a story of the 15th century.

23-544. Hand Tools for the World Market. *Western Machinery and Steel World,* v 38, Dec. 1947, p. 76-79, 100.

Production of wrenches, pliers, screw drivers, hammers by Plomb Tool Co.

23-545. A Western-Built Press Brake. George W. Freiberger. *Western Machinery and Steel World,* v. 38, Dec. 1947, p. 83-85.

Production of hydraulic press brakes by Pacific Industrial Mfg. Co., Oakland, Calif.

23-546. Compressed Air in Spring and Bumper Production. *Western Machinery and Steel World,* v. 38, Dec. 1947, p. 86-88, 111.

Forming, cleaning, and plating operations at United States Spring and Bumper Co., Los Angeles.

23-547. Engineered Steel Plate Work. *Western Machinery and Steel World,* v. 38, Dec. 1947, p. 89-93.

Fabrication of miscellaneous items by Pacific Coast Engineering Co.

23-548. Report on Vacuum Tools. Thomas A. Dickinson. *Tool Engineer,* v. 19, Dec. 1947, p. 41-43.

Principles of vacuum techniques and their application to tool engineering.

23-549. Aluminum Replaces Steel in Ford Parts. Chester S. Ricker. *American Machinist,* v. 91, Dec. 4, 1947, p. 96.

Substitution saves 120 lb. of raw material on each car and frees enough to build 100,000 additional cars.

23-550. British Jet Engines in Production. *Automotive Industries,* v. 97, Dec. 15, 1947, p. 36-37.

23-551. Engineering Uses for Steel Castings. John A. Rassenfoss. *Steel,* v. 121, Dec. 15, 1947, p. 90-91, 102, 104, 106.

Instances in which steel castings are used to advantage from an engineering and economic viewpoint. Most reliable basis for accepting a casting is a simulated service test on the casting as a unit, rather than properties of test bars.

23-552. Latest Metalworking Equipment Employed at New Chevrolet Indianapolis Truck Plant. *Steel,* v. 121, Dec. 22, 1947, p. 62-63, 88.

23-553. Selecting Aluminum Alloys for Specific Applications. Herbert Dobkin. *Steel,* v. 121, Dec. 22, 1947, p. 67-70.

23-554. Selecting Alloy Structural Steels for High-Toughness Applications. Bernard S. Lement. *Iron Age,* v. 160, Dec. 25, 1947, p. 80-84.

A simplified procedure consists of the following steps: Determine yield strength needed; select quenching medium; decide on the degree of martensitization to be imparted; and select the proper alloy steel from the table presented. The method is limited to yield strengths in the range of 80,000 to 150,000 psi. and to section sizes up to 5 in. in diameter. 10 ref.

23-555. Hardmetallskar for Bergborrning. (Hard Metal Bits for Rock Drilling.) Erik Ryd. *Jernkontorets Annaler,* v. 131, no. 9, 1947, p. 373-410; discussion, p. 411-424.

Tests were conducted to compare forged steel bits with hard metal bits. Results are tabulated in four groups according to the type of rock drilled.

23-556. For Deep Drawn Parts, Magnesium Has Outstanding Advantages. *Magnesium,* Nov. 1947, p. 6-7.

23-557. The Exaggerated Fire Hazard of Magnesium. Carl J. Lamb. *Journal of the American Society of Naval Engineers,* v. 59, Nov. 1947, 486-488.

Believes that fire hazard has been exaggerated and has impeded adoption of magnesium and its alloys where they might be profitably used.

23-558. Injector Manufacture. *Automobile Engineer,* v. 37, Nov. 1947, p. 417-426.

Production methods.

23-559. Aluminum Used in Combating Tank Corrosion. Gordon W. Alexander. *Petroleum Refiner,* v. 26, Dec. 1947, p. 99.

Use of sheet and tubular aluminum by Eastern States Petroleum Corp.

23-560. Bi-Metallic Plates. Part VI. J. S. Mertle. *National Lithographer,* v. 54, Dec. 1947, p. 36-37.

The many attempts to produce an improved plate during the period 1937-38. (To be continued.)

23-561. Alloys for Gas Turbines. William T. Griffiths. *Aircraft Production,* v. 9, Dec. 1947, p. 444-447.

Requirements for fatigue and corrosion resistance and ease of fabrication of blade, rotor disk, guidevane, and combustion-chamber materials. (Previously abstracted from condensed version in *Metal Industry.* See item 23-496.)

23-562. Increased Use of Gray Cast Iron in High-Temperature Operations. C. O. Burgess and T. E. Barlow. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 283-291.

Previously annotated in R.M.L., v. 2, 1945.

23-563. Castings and Weldings. Claude D. Gibb. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. A21-A26; discussion, p. A26-A27.

Previously annotated in R.M.L., v. 3, 1946.

23-564. Vicalloy—A Workable Alloy for Permanent Magnets. E. A. Nesbitt. *Transactions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division),* 1946, p. 415-425.

Previously annotated from *Metals Technology,* Feb. 1946, T.P. 1973, in R.M.L., v. 3, 1946.

SECTION XXIV

DESIGN AND STRESS ANALYSIS

24-1. An Analysis of Involute Sliding. Ben Bloomfield. *American Machinist*, v. 91, Jan. 2, 1947, p. 96-97.

Mathematical analysis of the sliding which takes place between the teeth of involute gears shows that involute contact near the base circle causes excessive wear which may result in scuffing or pitting. Higher active pressure angles and the use of enlarged and reduced combinations, or long and short addenda, tend to reduce the amount of involute sliding.

24-2. Method of Checking Compound Angles. James Ahearn. *Machinery (London)*, v. 69, Nov. 28, 1946, p. 688-691.

Method of checking compound angles has the advantage of not requiring any master blocks or parts. Single setup will serve to cover any combination of component angles, each of which may range from 0 to 90°.

24-3. Alclad. W. Thompson. *Metal Industry*, v. 69, Dec. 6, 1946, p. 465-466.

Investigation of some stress-strain characteristics shows that after tests had been carried out on Alclad to specifications D.T.D. 390, 546 and 610, in both the as-received and heat treated conditions, a distinct change was found in the straightline portion of the stress-strain diagrams.

24-4. General Stress-Strain Laws of Elasticity and Plasticity. A. Gleyzal. *Journal of Applied Mechanics*, v. 13, Dec. 1946, p. A261-A264.

Stress-strain laws discussed apply to problems where the material is elastic in some regions and plastic in others, for example, in a plastic-torsion problem or in a plastic-bending problem. These laws have experimental verification for metals in cases where strains are small and stresses and strains are either monotonically increasing or monotonically decreasing at any one point.

24-5. Notes on Stresses in Helical Springs. *Mainspring*, v. 11, Dec. 1946, 4 p.

Methods for evaluating the various stresses set up in helical springs during manufacture and operation; significance of these stresses in terms of fatigue life or excessive set.

24-6. Residual Stresses in Aluminum Alloys. R. M. Brick. *Aluminum and Magnesium*, v. 3, Dec. 1946, p. 8-11, 26-27.

Significance of terms; possible effects of residual stresses; measurement of stress intensity by mechanical methods, such as boring, cutting, slitting; typical data on quenched aluminum alloy cylinders; use of wire strain gage and strain rosettes for determining both the direction and intensity of principal stresses; X-ray analyses of machining and other stresses in aluminum alloy shapes; thermal origin of stress and control methods; stresses originating in mechanical deformation processes; stress-relief annealing. (To be concluded.)

24-7. Some Advantages and Assets of Magnesium. R. J. Cross. *Aluminum and Magnesium*, v. 3, Dec. 1946, p. 17-19, 33.

Comparative load-strain curves obtained from tensile test pieces of different materials which show that the specific ultimate strength of even low strength weldable magnesium-manganese alloy closely approaches that of commonly used high-strength aluminums. Use of magnesium for aircraft fuel tanks and their fabrication by welding is stressed. Beer crate is the typical civilian use.

24-8. Designing of "Trouble-Free" Dies. Part LXIV. C. W. Hinman. *Modern Industrial Press*, v. 8, Dec. 1946, p. 18.

Shaving portions of fiber blanks for squaring.

24-9. Predicting Bolt Tension. G. A. Maney. *Fasteners*, v. 3, no. 5, 1946, p. 16-18.

Investigation was undertaken to find out how accurately tensions could be estimated from a measurement of the torque applied in tightening the nut.

Preliminary results on low-carbon steel, rolled-thread, stress-relieved bolts indicate that a fair approximation of applied load may be obtained in this way.

24-10. Diamond Hardmetal Drill Bits. H. N. Tegkayev. *Industrial Diamond Review,* v. 6, Dec. 1946, p. 377.

New design of drill bit for exploratory and production work in mining. (Abstracted from *Gornii Journal,* March 1946, p. 25-56.)

24-11. Design of Exhaust Systems. Part XXIX. F. H. Stebbins. *Sheet Metal Worker,* v. 37, Dec. 1946, p. 48-50, 56.

Elimination of gold, silver and platinum dust by proper type of exhaust system.

24-12. Flexible Couplings. *Western Machinery and Steel World,* v. 37, Dec. 1946, p. 112-114.

Design details of three main types: large link and pin type coupling; the intermediate type, which consists of two flanges pinned together through a leather disk; and the smallest type, which is essentially a leather bushing within one of two pinned flanges.

24-13. Development of Jacketed-Type Steel Drier Rolls. William H. Funk. *Steel Processing,* v. 32, Dec. 1946, p. 775-779, 791.

Use of welded steel single-shell drier roll, installed as a replacement in a bank of cast iron drier rolls in which there had been a failure, provoked considerable thought and discussion because of the increased operating efficiency and longer bearing life, through improved journal design, which resulted. Advantages have continued over the more than 12 years of nearly continuous service rendered by the drier roll which is operating in a mill making paper board. Various design problems.

24-14. Designing, Drafting and Using Press Tools. C. W. Hinman. *Steel Processing,* v. 32, Dec. 1946, p. 788-791.

Problem concerns forming a steel tube and joining its ends. Nomenclature of the die parts shown in drawing. Operation of the die.

24-15. Current Automotive Bumper Designs Introduce New Production Problems. *Steel Processing,* v. 32, Dec. 1946, p. 792-794.

Brief history of development of bumpers. Materials, design, and production problems of bumpers for automobiles, trucks and buses.

24-16. Structural Investigation in Still Water of the Welded Tanker "Neverita". F. B. Bull. *Welding Journal,* v. 25, Dec. 1946, p. 809s-843s.

Some of the instruments and methods developed in British work. Factors influencing their design. Methods of using the instruments and their principles of operation are described. Details of the tests and their results. Tables, charts, and diagrams.

24-17. Variation of Longitudinal Residual Strain Through the Thickness of a 1-In. Unionmelt Weld. J. L. Meriam, Finn Jonassen and E. Paul DeGarmo. *Welding Journal,* v. 25, Dec. 1946, p. 844s-847s.

A series of tests was conducted in order to better interpret the residual weld stresses as measured with surface gages in terms of the strain condition in the interior of the weld. Experimental procedures and results are shown by charts and diagrams.

24-18. The Prospects of the Steam Cycle in the Central Power Station. (Continued.) G. H. Martin. *Engineers' Digest,* v. 3, Dec. 1946, p. 597-598.

Problems of construction, including performance of various metals and alloys for stressed high-temperature service; design of feed systems. (Condensed from Advance Copy, Institution of Mechanical Engineers, Sept. 1946, 8 p.)

24-19. Drilling and Boring Tools. *Tool Engineer,* v. 17, Jan. 1947, p. 45-46.

Jig and fixture design.

24-20. Shrinkage Allowance in Die-Casting Die Design. R. L. Wilcox. *Tool & Die Journal,* v. 12, Jan. 1947, p. 68-71, 98F.

Factors influencing the extent of shrinkage that will take place in die castings produced in steel dies under pressure and under given conditions. Effects of these variable factors upon the amount of shrinkage that would normally take place under theoretical or ideal conditions. While a general, all-purpose, practical shrinkage allowance figure will prove satisfactory in designing dies for most die castings, further consideration must be given to certain very simple or extremely complicated castings to arrive at a more exact shrinkage allowance.

24-21. Mohr Circle. *Testing Topics,* v. 2, Nov. 1946, p. 1-8.

Use of Mohr circle in stress and strain analysis, explained with simple geometric and trigonometric diagrams.

24-22. Helical Gear Design. E. M. Currie. *Machine Design,* v. 19, Jan. 1947, p. 100-104.

Tooth strength and wear factors determined by testing sample gears of specified material on a special machine.

24-23. Production Processes—Their Influence on Design. Part XIX. Metallizing. Roger W. Bolz. *Machine Design,* v. 19, Jan. 1947, p. 105-110.

Applications of metallizing; proce-

dure; avoidance of sharp edge or point bearing; spray welding with powders; design of parts; materials used; tolerances.

24-24. Reinforcement of Branch Pieces. J. S. Blair. *Engineering,* v. 162, Dec. 6, 1946, p. 529-533, 540; Dec. 13, 1946, p. 553-556.

Static bending test and vibration test results on welded pipe ties reinforced in different ways. Test result for static bending and for vibratory stressing. It is concluded that the "triform" reinforcement is most satisfactory for all types of both static and vibrational forces. (To be continued.)

24-25. Utilizing Mechanical Properties in Die Casting Design. Part IV. Members Subjected to Bending and Axial Loads. (Continued.) Joseph Marin. *Die Castings,* v. 5. Jan. 1947, p. 21-22, 44.

Design of columns and short members subjected to bending and axial loads.

24-26. Cardboard Mockups. Morton P. Matthew. *Product Engineering,* v. 18, Jan. 1947, p. 120-122.

Cardboard drastically reduces limitations, and provides a medium from which accurate and detailed reproductions can be made. Methods of construction together with the characteristics and advantages.

24-27. Designing for Economy of Material, Tooling, Labor. Kenneth W. Schmidt. *Product Engineering,* v. 18, Jan. 1947, p. 132-136.

Substantial savings were realized by more economical choice of materials, requiring less machining time. Material cost tables.

24-28. Dimension and Tolerances—Fundamental Principles. Merhyle F. Spotts. *Product Engineering,* v. 18, Jan. 1947, p. 160-164.

Necessity and fundamentals of specifying tolerances. Relative advantages of unilateral and bilateral and of cumulative and noncumulative tolerancing methods. Selective assembly for parts requiring small tolerances and the use of datum surfaces.

24-29. Taper Measuring Formulas and Methods. W. Richards. *Machinery (London),* v. 69, Dec. 9, 1946, p. 786-791.

Almost all calculations and measurements required in the production of tapers and taper gages may be based solely upon the given taper per foot, or usually, upon the derived taper per unit length, or the taper per inch a side. Each method considered.

24-30. Biaxial Stresses in Rigid Vessel Simulated in Notched Tension Coupon. Given Brewer. *Metal Progress,* v. 51, Jan. 1947, p. 91-96.

Strain gage stress analysis of weld metal of a small pressure vessel showed that working loads resulted in close approach to yield point in both tangential and longitudinal directions. Shows how these stresses can be simulated and suggests use of tension impact tests at various temperatures to obtain information about the working behavior of steel in rigid structures and its transition temperature from ductile to brittle condition.

24-31. Nondestructive Measurement of Residual and Enforced Stresses by Means of X-Ray Diffraction. George Sachs, Charles S. Smith. Jack D. Lubahn. Gordon E. Davis, and Lynn J. Ebert. *Welding Journal,* v. 26, Jan. 1947, p. 26s-49s.

Tests on notched tensile bars and in the vicinity of a welded joint in aircraft steel tubing. Data on the effects of stress and degree of notching on the principal stresses and stress-concentration factors for flat notched tensile test specimens. X-ray techniques were found to be of limited value. 19 ref.

24-32. Compressive Strength of 24S-T Aluminum-Alloy Flat Panels With Longitudinal Formed Hat-Section Stiffeners. Evan H. Schuette, Saul Barab, and Howard L. McCracken. *National Advisory Committee for Aeronautics Technical Note No. 1157*, Dec. 1946, 15 p.

Results tabulated and charted.

24-33. Column and Plate Compressive Strengths of Aircraft Structural Materials. Extruded 0-1HTa Magnesium Alloy. George J. Heimerl and Donald E. Niles. *National Advisory Committee for Aeronautics Technical Note No. 1156,* Jan. 1947, 9 p.

Strengths were determined both within and beyond the elastic range from tests of flat-end H-section columns and from local-instability tests of H, Z, and channel-section columns.

24-34. Effect of Rivet or Bolt Holes on the Ultimate Strength Developed by 24S-T and Alclad 75S-T Sheet in Incomplete Diagonal Tension. L. Ross Levin and David H. Nelson. *National Advisory Committee for Aeronautics Technical Note No. 1177*, Jan. 1947, 10 p.

Shear stresses on the cross section were nearly constant for all values of the rivet factor investigated if the other properties of the web were not changed.

24-35. Reinforcement of Branch Pieces. (Concluded.) J. S. Blair. *Engineering,* v.162, Dec. 20, 1946, p. 577-581; Dec. 27, 1946, p. 605-606.

Appendices giving more detailed information concerning an extensive investigation of various designs for reinforcement of welded steel pipe branches. They include details of test methods used; strength test results on horseshoes and rings used for reinforcement; calculations used in design

of "triform" type of reinforcement; and four examples.

24-36. Strength Testing Douglas DC-6. Milton A. Miner. *Automotive and Aviation Industries*, v. 96, Jan. 15, 1947, p. 22.
Some of the special equipment and techniques used in static testing of the completed plane before test flight.

24-37. Electrical Resistance Wire Strain Gages to Measure Large Strains. K. H. Swainger. *Nature,* v. 159, Jan. 11, 1947, p 61-62.
"Minalpha" wire supplied by Johnson Matthey (British firm) was compared with several other wires for use in the type of strain gage using fine metal filaments stuck to a paper base. Results show that, by using "Minalpha" wire with an unstrained joint, the range of the resistance wire strain gages is quadrupled. The composition of the wire is not given.

24-38. Designing Tools for Screw Machine Production. *Screw Machine Engineering,* v. 8, Dec. 1946, p. 64-67.
Illustrations with explanatory notes.

24-39. Designing of "Trouble-Free" Dies. Part LXV. C. W. Hinman. *Modern Industrial Press,* v. 9, Jan. 1947, p. 18, 44.
Compressed air applications.

24-40. Design and Fabrication of Welded Magnesium Tanks for Aircraft. R. J. Cross. *Light Metal Age,* v. 5, Jan. 1947, p 8-15.
Comprehensive treatment covers design for structural stability and for minimizing corrosion; welding design and technique; correcting distortion; sheet metal standards; final finishing.

24-41. Photographic Reproduction as an Engineering Tool. Dyche E. Clark. *Iron Age,* v. 159, Feb. 6, 1947, p. 60-63, 121.
Use of photographic reproductions for cutting costs and speeding various phases of manufacturing operations. Techniques and equipment used in transferring engineering drawings directly to the material to be fabricated to eliminate templets, for reproducing drawings to various scales, for copying patterns and bend blocks directly from drawings, for projecting drawings to a shrink scale for pattern and diemaking, and for making a full drawing of a symmetrical part from a half figure.

24-42. Residual Stresses in Aluminum Alloys. (Concluded.) R. M. Brick. *Aluminum and Magnesium,* v. 3, Jan. 1947, p. 6-7, 24.
Origin of residual stresses; residual stresses of mechanical origin; stress relief.

24-43. Getting the Most From a Die Casting Design. H. K. Barton. *Die Castings,* v. 5, Feb. 1947, p. 15-16, 40-41.
Case history which illustrates the service a die caster can provide in adapting a design to this process.

24-44. Design of Die Cast Threads. *Die Castings,* v. 5, Feb. 1947, p. 42-44.
Suggestions as to when threads can be cast.

24-45. Photo-Elastic Models Reveal Weld Stresses. James J. Ryan. *Welding Engineer,* v. 32, Feb. 1947, p. 46-48.
Investigation of the residual weld stresses by the photo-elastic method carried out at the University of Minnesota, using a specially developed bakelite which has the property of expansion with the temperature and the characteristic of becoming relatively weak at temperatures above 230° F. It is possible to determine the location of maximum residual stresses with plug welds and the effects of plate temperatures surrounding the weld. Same method of analysis may easily be extended to linear welds.

24-46. Measuring Stresses Electrically on Power-Driven Machinery. W. R. Mehaffey. *Electrical Manufacturing,* v. 39, Feb. 1947, p. 91-95, 156, 158, 160, 162.
Use of electric resistance strain gages in design of equipment.

24-47. Metallography, Fatigue of Metals and Conventional Stress Analysis. H. F. Moore. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 2,* Dec. 1946, 16 p.
History of stress analysis in premetallographic days, including the work of Hooke and the development of elastic theory. Influence of stress concentration and the sensitivity of materials to notches, and some of the ways in which such effects can be minimized. Limitations of stress analysis.

24-48. Fatigue Problems Associated With Aircraft Materials. H. Sutton. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 4,* Dec. 1946, 15 p.
Fatigue properties of materials under simple conditions of loading as employed in laboratory tests with special reference to light alloys and to different conditions of stressing. Effect of surface finishes on fatigue properties. Influence of loads occurring in service in the light of available data and research results. Importance of good design for avoidance of fatigue failure; methods of improving fatigue resistance, with special reference to nitriding of steels, shot-peening, antifretting treatments, surface rolling, stress-relieving grooves, and stress-relieving heat treatments.

24-49. The Factors Contributing to Fatigue Failure in Aircraft. C. W. George, S. F. Grover and B. Chalmers. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 5,* Dec. 1946, 6 p.
Results of examination of fatigue failures of metallic components in aircraft and various factors that con-

tribute to the formation of fatigue cracks. The usual method of expressing the results of laboratory fatigue tests affords insufficient data for aircraft designers; suggestions for obtaining more accurate information for design purposes.

24-50. Repeated Loading on Structures. A. G. Pugsley. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 6,* Dec. 1946, 6 p.

Considerations of loads which are repeated at intervals ranging from seconds to hours and at rates which can be regarded as gradual compared with the natural periods of the structures concerned. It is important to carry repeated load tests to ultimate collapse since initial failure may not give a true indication of the mode of ultimate failure.

24-51. Structures Liable to Fatigue Failure and Some Considerations in Their Design. L. R. Jackson and H. J. Grover. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 7,* Dec. 1946, 9 p.

Results of experimental work recently carried out in the United States and a number of the more important considerations such as stress distribution under repeated loads, types of repeated stress, stress concentration, size effect and surface conditions.

24-52. The Measurement of Dynamic Strain. F. W. Hooton. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 10,* Dec. 1946, 22 p.

Requirements of devices for measuring dynamic strains and the general principles of operation of various types of electrical and mechanical gages. Electrical resistance strain gage and its associated equipment, fields of application and the limitations of particular circuits which have been successfully used. Additional complications introduced when strains are to be measured on rotating members.

24-53. Determination of Stress Concentration Factors. F. S. Shaw. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 12,* Dec. 1946, 31 p.

Better known methods of determining stress concentration factors. Relative merits of the methods and the use of stress concentration factors in design. An appendix summarizes the stress concentration factors for a variety of different stress raisers.

24-54. Photo-Elasticity and Stress Concentration. W. H. H. Gibson. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 13,* Dec. 1946, 13 p.

The technique of photo-elasticity as applied to problems of stress concentration. Cutting tools and methods used in the preparation of models, together with edge effects and annealing of the photo-elastic material. Thickness ratio as a means of estimating the limiting radius for a notch, groove, or similar stress raiser, below which results are likely to become unreliable. Stress determination at loaded boundaries and internal points, with particular reference to the Coker lateral extensometer. Frozen-stress technique.

24-55. Residual Stresses, Their Measurement and Their Effects on Structural Parts. George Sachs. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 15,* Dec. 1946, 11 p.

Method for measuring residual stresses developed by the author in 1927 and its limitations and applications. Mathematical details of the method. Relations between the residual stresses and the strength properties.

24-56. The Design of Cylindrical Shaft Subjected to Fluctuating Loading. G. G. McDonald. *Symposium on the Failure of Metals by Fatigue, University of Melbourne Preprint 16,* Dec. 1946, 8 p.

"Maximum elastic distortional energy" theory of failure is applied to a cylindrical shaft subjected to combined fluctuating bending, twisting and direct loads. An expression is derived for the particular case of combined fluctuating, bending and twisting moments. Experimental results on combined loading of cylindrical specimens confirm the formula.

24-57. The Use of Electric Gaging Equipment in Machine Design. P. E Nokes and E. G. Carr. *Mechanical Engineering,* v. 69, Feb. 1947, p. 117-119.

Basic apparatus; several specific arrangements show the design engineer how this equipment can be of value to him.

24-58. Are You Designing Correctly? G. E. Campbell. *Industry and Welding,* v. 20, Feb. 1947, p. 30-32, 80-82.

How to calculate shrinkage, select subassemblies, prepare joints, and determine type and size of welds.

24-59. Wire Dimensions for Screw Threads. John Wesley Lee. *Tool Engineer,* v. 18, Feb. 1947, p. 36-38.

Effect that the thread helix angle has on the shape and size of the thread at a normal section, and how it affects the calculation of authentic wire dimension.

24-60. Light Metals Dominate French Automotive Design. *Product Engineering,* v. 18, Feb. 1947, p. 81-87.

Automobile design in France is governed by three major considerations; adoption of lightweight alloys of aluminum, and in a few instances magnesium; development of the one-piece body chassis utilizing the

stressed skin principle; and widespread use of the flat twin-cylinder air-cooled engine.

24-61. Designs for Sheet Metal Boxes With Square and Round Corners. Part I. *Product Engineering,* v. 18, Feb. 1947, p 122-123.

Designs for seamed, welded, and folded constructions. Blank sizes and methods of manufacture.

24-62. Models: Short Cut to Good Design. *Modern Industry,* v. 13, Feb. 15, 1947, p. 44-47.

How astute designers and manufacturers are using models.

24-63. Photogrid Process Applied to Problems in Machine Design. G. A. Brewer. *Machine Design,* v. 19, Feb. 1947, p. 120-122.

Use of this process for determination of plastic strains over almost any size gage length, or strains encountered during forming operations.

24-64. Highlights From Machine Design Group Meeting. *Machine Design,* v. 19, Feb. 1947, p. 123-128.

Abstracts of following papers presented at two 1946 meetings of Machine Design group of A.S.M.E. Stress and Strength of Machine Parts by Charles Lipson; Design of Large Broaching Machines by George R. Squibb; Electronic Measurement in Design by P. E. Nokes and E. G. Carr; Kinematics of Cam and Follower by Allan H. Candee; Ball Bearing Ratings by Thomas Barish.

24-65. Bending Stiffness of Beams With Ribs or Slots. R. L. Benford. *Machine Design,* v. 19, Feb. 1947, p. 157-158.

An exact method, developed for circular sections but applicable to other symmetrical profiles. Formulas are given for calculating the bending stiffness corrections for one or more ribs or slots on a round section.

24-66. Rubber Mountings Minimize Impact From Jolt Molding Machines. H. J. Knell. *Iron Age,* v. 159, Feb. 20, 1947, p. 54-56.

Use of rubber mountings to minimize the vibration of surrounding areas caused by operation of jolt molding machines.

24-67. Irregular Intermittent Motion. *Machinery (London),* v. 70, Jan. 23, 1947, p 113.

Design details of mechanism which transmits intermittent rotary motion, used on a machine that fabricates a wire screening material having a mesh of alternately increasing and decreasing size.

24-68. Control of Vibration Can Increase Production Efficiency. Part II. John Parina, Jr. *Steel,* v. 120, Feb. 24, 1947, p 76-79, 120, 122, 124, 126.

Continues the survey of antivibration materials available to industry; characteristics of additional standard mountings and methods of application.

24-69. Progress Report on Stress Measurements on Various Designs of Solid Manganese Crossing Frogs. *American Railway Engineering Association Bulletin,* v. 48, Feb. 1947, p. 558-568.

Design details on extensive inserts. Wire resistance strain gages used to measure stresses.

24-70. Service Tests of Various Types of Joint Bars. *American Railway Engineering Association Bulletin,* v. 48, Feb. 1947, p. 693-714.

Nine types of joint bars for 112-lb. rail and twelve types for 131-lb. rail have been subjected to service tests.

24-71. Designing of "Trouble-Free" Dies. Part LXVI. C. W. Hinman. *Modern Industrial Press,* v. 9, Feb. 1947, p. 18, 46.

Designing a transfer slide.

24-72. Welded Magnesium Tanks. Part II. R. J. Cross. *Aircraft Production,* v. 9, Feb. 1947, p. 71-75.

Aspects of design with particular reference to fulfillment of load requirements, ease of production by welding, and accommodation of the many and various auxiliary fittings which modern aircraft tanks must carry. (To be continued.)

24-73. Observations on the Behavior of Some Noncircular Aluminum Alloy Sections Loaded to Failure in Torsion. R. L Moore. *National Advisory Committee for Aeronautics Technical Note No. 1097,* Feb. 1947, 18 p.

Second part of an investigation of the strength and stiffness characteristics of noncircular aluminum alloy sections loaded to failure in torsion, using a cruciform and an I-section and several extruded flanged members of I, Z, and channel section.

24-74. Data on Optimum Length, Shear Strength, and Tensile Strength of Age-Hardened 17S-T Machine-Countersunk Rivets in 75S-T Sheet. Evan H. Schuette and Donald E. Niles. *National Advisory Committee for Aeronautics Technical Note No 1205,* March 1947, 12 p.

Results of a test program.

24-75. Graphical Methods in the Solution of Equations Applied to the Determination of Economical Container Dimensions. Kenneth L Jackson. *Sheet Metal Industries,* v. 24, Feb. 1947, p. 329-330.

A simple graphical method for solving certain quadratic equations which were derived in previous articles by the same author.

24-76. Some Experiments on the Distribution of Deflection and Stress in Thin Flat Plates Subjected to Practical Systems of Loading. H. D. Conway and V. C Davies. *Sheet Metal Industries,* v. 24, Feb. 1947, p. 355-363.

The case of four supports equidistant from the center of a circular plate is worked out mathematically. Tables and diagrams. (To be continued.)

24-77. Control of Vibration Can Increase Production Efficiency. Part III. John Parina, Jr. *Steel,* v. 120, March 3, 1947, p 116-120, 122, 156, 159-160, 162, 165.

Products and methods of application recommended by seven additional manufacturers.

24-78. Device for Measuring Principal Curvatures and Principal Strains on a Nearly Plane Surface. A. E. McPherson. *National Advisory Committee for Aeronautics Technical Note No. 1137,* Feb. 1947, 12 p.

Makes possible the measurement of principal extreme-fiber bending strains over a circular area having a radius of 0.94 in. with a systematic error on 0.1-in. sheet of the order of ± 0.00003. Requires a Tuckerman autocollimator and three 1-in. Tuckerman strain gages. Equations are presented for computing median fiber strains from measured curvatures and strains at the surface, and from sheet thicknesses.

24-79. Effect of Centrifugal Force on the Elastic Curve of a Vibrating Cantilever Beam. Scott H. Simpkinson, Laurel J. Eatherton and Morton B. Millenson. *National Advisory Committee for Aeronautics Technical Note No. 1204,* Feb. 1947, 8 p.

Results of a study to determine the effect of rotation on the dynamic stress distribution in vibrating cantilever beams presented together with experimental results obtained by means of stroboscopic photographs and strain gages.

24-80. Magnesium Alloys for Aircraft. Part III. F. A. Rappleyea. *Aero Digest,* v 54, Feb. 1947, p. 70-72, 135-137.

Equations by which weight savings of magnesium alloys over aluminum alloys for equal strength properties may be calculated. The relative properties of certain parts made of the two metals.

24-81. A Matter of Record. S. G. Langley. *Die Castings,* v. 5, March 1947, p. 17-18, 41, 42, 43.

Redesign of an aluminum die casting has reduced the weight and size of dictating machine. Most important of all it has provided uniformity in many dimensions where close tolerances are required, obviating difficult and expensive machining.

24-82. Utilizing Mechanical Properties in Die-Casting Design. Part V. Joseph Marin. *Die Castings,* v. 5, March 1947, p 19-20, 43, 45, 46-50.

Designing for fluctuating, alternating, repeated and fatigue stress. Three types of fatigue testing used to study behavior of materials when subjected to repeated loadings. Interpretation of fatigue strength results.

24-83. The Future of the High-Temperature Steam Piping Expansion Problem. F. A. Scanlan. *Journal of the American Society for Naval Engineers,* v. 59, Feb. 1947, p. 48-56.

A bellows-type expansion joint which, it is believed, will allow use of higher steam temperatures without further increases in the high-temperature properties of the alloys used.

24-84. Threading of High-Temperature Bolt Studs. K. D. Williams. *Journal of the American Society of Naval Engineers,* v. 59, Feb. 1947, p. 57-64.

Results of tests made to determine the load-deformation characteristics of several thread types developed for use at temperatures of 850° F. and above.

24-85. Practical Design of Rubber Parts. Edward E. Blaurock. *Machine Design,* v. 19, March 1947, p. 115-120.

Practical and vitally important details involved in both design and manufacture of adhered or bonded rubber-metal parts.

24-86. Helical Spring Design Tables. H. F. Ross. *Machine Design,* v. 19, March 1947, p 153-158.

Standard steel wire gages between 0.025 and 0.394-in.; music wire gages between 0.010 and 0.118-in.; and most of the even fractional dimensions. For any given outside diameter between ⅛ in. and 4½ in., all of these gage sizes may be found which fall within the index extremes of 3 and 20. Odd wire sizes or nonferrous materials may also be handled with little additional work.

24-87. A New Criterion for the Design of Wire Ropes. M. Ten Bosch. *Engineers' Digest (American Edition),* v. 4, Feb. 1947, p. 67-69.

Equations for use in design and estimation of the life of steel wire ropes. (Condensed from *Schweizerische Bauzeitung,* v. 128, Nov. 9, 1946, p. 237-239.)

24-88. Tooling Dock Simplifies Building Assembly Fixtures. Leland A. Bryant. *Iron Age,* v. 159, March 20, 1947, p. 60-62.

Applicable to a wide variety of large structures such as automobiles, aircraft and railroad cars. By means of longitudinal, vertical and transverse straightedges, any point in space can be accurately located without the use of conventional measuring instruments and any number of exactly similar fixtures may be constructed without danger of human error or accumulation of tolerances.

24-89. Designing Tools for Screw Machine Production. Part VII. *Screw Ma-*

chine Engineering, v. 8, March 1947, p. 36-38.

Drills, flat counterbores and spiral-relieved end-cutting tools.

24-90. Wire Strain Gages Relate Shaft Torque. *SAE Journal,* v. 55, March 1947, p 66.

Resistance wire strain gages used for measuring static stresses adapted to torque measurement of engine shafts. Drawing shows how torque-sensitive strain gages are attached to a shaft to form a Wheatstone bridge circuit. Measuring torque with this configuration eliminates disturbances from bending, thrust or pull, temperature variation, and changes in resistance at brush contacts. (Digest of paper "Equipment for Separately Measuring Power in the Cylinder Shaft, Threshing Machinery and Sickle Bar Components of Combine Harvesters," by A. C. Ruge, J. H. Meier and C. H. Gibbons.)

24-91. Design for Sheet Metal Boxes With Square and Round Corners. Part II. Wallace C. Mills. *Product Engineering,* v. 18, March 1947, p. 122-123.

Designs incorporating tabs, hems, and reinforcements.

24-92. The Case for Axonometric Drawing. Paul F. Boehm. *Steel,* v. 120, March 24, 1947, p. 80-81, 103.

Compares simplicity of one-view engineering drawings to conventional multiplanar, or three-view drawings.

24-93. The Evolution of Diesel Engine Block Weldment Design and Fabrication. James W. Owens. *Welding Journal,* v. 26, March 1947, p. 240-247.

The various designs and reasons for changes made. A number of revisions to the American Welding Society's definitions of terms used in structural welding and inspection, which were found necessary on account of improvements in inspecting methods.

24-94. Discussion of the Paper "Redistribution of Residual Welding Stresses by Tensile Loading Along a Unionmelt Weld Joining Two 3-Ft. x 12-Ft. x 1-In. Plates". *Welding Journal,* v. 26, March 1947, p. 138s, 191s-192s.

E. M. MacCutcheon and J. Vasta discuss separately a paper by Meriam, DeGarmo, and Jonassen, published in Oct. 1946 issue. Both discuss the problem of applying the laboratory results to welded ship structures. Mr. Vasta gives some strain gage results from tests on a Liberty ship. Authors' reply.

24-95. Forging Die Design. John Mueller. *Steel Processing,* v. 33, March 1947, p. 164, 166.

Die typing.

24-96. Principles of Design for Carbides and Some Unusual Applications. *Iron Age,* v. 159, March 27, 1947, p. 56-57.

The development of carbides. A great increase in their utilization has occurred since 1939 because of the introduction of materials containing tantalum, titanium, and columbium carbides. Design principles and the three principal techniques used to form carbide shapes.

24-97. How to Cut Costs of Plastic Molds. Harold L. Flynn. *American Machinist,* v. 91, March 27, 1947, p. 93-100.

Development of a method of casting stainless-steel cavities; forces, and inserts. Patternmaking methods and design for cast cavities.

24-98. Designing of "Trouble-Free" Dies. Part LXVII. C. W. Hinman. *Modern Industrial "Press",* v. 9, March 1947, p. 22

Assembling dies.

24-99. Hardware Design. H. K. Barton. *Die Castings,* v. 5, April 1947, p. 22, 41, 43.

Suggests some methods for designing knobs, handles, and other small hardware parts of approximately spherical or ellipsoidal shape.

24-100. Engineering Aspects of the Involute Spline. H. E. Linsley. *Iron Age,* v. 159, April 3, 1947, p. 64-68.

Involute spline offers many advantages over the old-style straight-side spline, both as regards structural strength and simplicity of tooling. Engineering and manufacturing aspects compiled through the cooperation of the Broaching Tool Institute, Detroit, and mathematical formulas for calculating the torque capacity of splined fittings.

24-101. Casting Design. Richard A. Flinn. *Foundry,* v. 75, April 1947, p. 106-109, 267-268, 270.

Experimental stress analysis and its application in the foundry field in order to further cooperation between casting designer and foundryman.

24-102. Formulas for Determining the Weights of Castings. (Continued.) *Foundry,* v. 75, April 1947, p. 175-176.

Formulas and tables for segments of rings of elliptical cross section; segments of solids generated by revolving a plane area about an axis; inside and outside circular fillets and their sectors. (To be concluded.)

24-103. Stresses and Deflections of Two Cargo Liners During Launching. K. J. Pascoe. *Transactions of the Institution of Engineers & Shipbuilders in Scotland,* v. 90, Dec. 1946, p. 126; discussion, p. 157-168; Jan. 1947, p. 169-171.

Investigations were made during launching of two similar ships, one of which was partly welded and the

other of riveted construction. The primary object was to measure the longitudinal strains and the deflections imposed on the ship's structure during launching and to relate these to the position of the ship on the ways. No conclusive evidence of any difference in structural behavior between the two forms of construction was revealed. Curves of both experimental and calculated values of stress and deflection are included.

24-104. The Stresses in Cylindrical Vessels. H. D. Conway. *Aircraft Engineering,* v. 19, Feb. 1947, p. 52-54.

Expressions for maximum bending moment and shearing force in vessels closed at one end and subjected internally to gas pressure and hydrostatic pressure. Since the expressions are very cumbersome, graphs are given whereby maximum bending moment and shearing force can be found for any cylindrical vessel subjected to gas or hydrostatic pressure.

24-105. Investigations of 24S-T Riveted Tension Joints. R. L. Fefferman and H. Langhaar. *Journal of the Aeronautical Sciences,* v. 14, March 1947, p. 133-147.

Test data for approximately 110 tension joints formed by uniting 24S-T sheets with protruding-head rivets. With the aid of an empirical "stress-concentration" factor, the data are correlated with a modified form of the theory of tension joints. An algebraic formulation of the elementary theory. Rules for laying out efficient joints.

24-106. Beam-Columns. Wm. R. Osgood. *Journal of the Aeronautical Sciences,* v. 14, March 1947, p. 167-170.

An improved method of designing beam-columns which appears to be both safe and economical.

24-107. Drawing Die Problems and Formulas. James Walker. *Tool Engineer,* v. 18, April 1947, p. 40-42.

Advanced design and construction of simple and compound drawing dies for the mass production industry.

24-108. Designing Tools for Screw Machine Production. Part VIII. *Screw Machine Engineering,* v. 8, April 1947, p 46-48.

End working tools.

24-109. Poor Design May Stymie Shop Savings. Chester S. Ricker. *American Machinist,* v. 91, April 10, 1947, p. 140b-140c.

Resistance welded designs illustrate that cooperation between designers, process engineers, and production men can cut costs.

24-110. Graphical Method of Determining Size of Round Blanks. G. A. Larri. *Machinery,* v. 53, April 1947, p. 147-148.

A means of determining the diameter of a blank for a round drawn shell where the contour of the drawn shell is such as to make mathematical calculation of the blank diameter somewhat difficult. Method is applicable in cases where the thickness of the blank remains constant and also in cases where a variation in thickness occurs during the drawing operation.

24-111. Some Design Aspects of Hopper-Car Construction. W. B. Brooks. *Railway Mechanical Engineer,* v. 121, April 1947, p. 157-158.

Effects of stresses and drainage on the corrosion and cracking of steel plates and the value of welding in eliminating them.

24-112. Torsion-Bar Valve-Springs of Unusual Design Used in French Engine. W. F. Bradley. *Automotive and Aviation Industries,* v. 96, April 1, 1947, p. 24-26.

Patented feature of the torsion-bar valve-spring system is the use of torsion bars in pairs, thus reducing the length of the installation and eliminating the problem of housing longer bars. Valves are mounted vertically in the cylinder head, and are operated in the usual manner by push-rods and rockers. Metal used for the bars is chromium-nickel steel.

24-113. Design for Resistance Welding. Harold S. Card. *Electrical Manufacturing,* v. 39, April 1947, p. 98-102, 182, 184, 186.

Design factors that are of fundamental importance in obtaining the desired economy of production consistent with optimum weld strength for each of the resistance welding processes.

24-114. Designing Form Tools to Eliminate Production Loss. Harold P. Berry. *Production Engineering & Management,* v. 19, April 1947, p. 61-64.

Elements of design in form tools for bar stock used in automatic screw machines to reduce machine downtime resulting from the trial and error system of tooling.

24-115. Production Processes. Their Influence on Design. Roger W. Bolz. *Machine Design,* v. 19, April 1947, p. 169-174.

Design factors for production milling.

24-116. Metallurgy, Engineering and Specs. *SAE Journal,* v. 55, April 1947, p. 55-57.

The differences often encountered between experimental stress figures and those arrived at by conventional design formulas. Five reasons for making structures stronger while also making them lighter; and the steps usually followed in design improvement. (Excerpt from "Is There a Relationship Between Metallurgy, Engineering and Materials Specifications", by Francis G. Tatnall.)

24-117. The Welding of Stainless Steel for Jet Propulsion. E. J. DeWitt and F. J. Lammers. *Welding Journal,* v. 26, April 1947, p. 320-323.

Evolution in the design of a bellows for support of jet turbine-nozzle blading in its frame. The original design called for five welds and 50 ft. of welding on a 3-ft. diameter, ⅛-in. piece, weighing only 90 lb. This required highly skilled welders, so the unit had to be redesigned so that it could be welded by women who had received only a short course in welding. Several steps took place before a final design was evolved which required much less welding and also much less skill on the part of the operators.

24-118. H-Section Welded Trusses. A. T. Waidelich. *Welding Journal,* v. 26, April 1947, p. 327-331.

The development of the above standard sections by the Austin Co. The term "H-section truss" refers to a truss in which all members are conventional rolled H or I sections with the webs of all members lying in the same vertical plane, and with all connections made at abutting surfaces of these H and I sections by fillet welds. The development consisted of analysis and design of the truss and an extensive program of testing, including loading two 50-ft. trusses to failure and a strain gage test of two 80-ft. trusses.

24-119. The Design of Steel Castings. *B.S.F.A. Bulletin,* v. 1, July 1946, p. 2-7.

First issue of the above publication is entirely concerned with elementary principles of casting design and the selection of steels on the basis of physical properties.

24-120. Abaques pour le Calcul du Bénéfice Apporté par l'Allégement des Carrosseries Industrielles. (Graphic Calculation of Advantages to be Obtained by Decreasing the Weight of the Bodies of Commercial Vehicles.) H. Colombier and Pierre de Lapeyriere. *Revue de l'Aluminium,* v. 24, Jan. 1947, p. 19-28.

A method for calculation of the optimum weights of industrial vehicles. The method is applied to show the advantages of light-alloy framework for construction of prefabricated bodies of various types.

24-121. Design of Steel Castings. *B.S.F.A. Bulletin,* v. 1, Oct. 1946, p. 1-7.

Amount of shrinkage; types of feeder head, directional solidification, and chills.

24-122. Design of Steel Castings. Hot Tears and Pulls. *B.S.F.A. Bulletin,* v. 1, March 1947, p. 1-7.

Hot tearing and ways to prevent it by proper design and casting technique.

24-123. Stress Analysis by Photo-Elastic Methods. C. Mylonas. *Sheet Metal Industries,* v. 24, April 1947, p. 807-809.

Condensation of a lecture recently given before the Mathematical and Physical Society of University College, London.

24-124. Stampers Report on Product Redesign. *Steel Processing,* v. 33, April 1947, p. 225-226, 252.

Cross section of stamping uses indicates the wide range of large and small stampings used in the production of new or redesigned products.

24-125. Photographic Layout Reproduction. J. Johnston. *Aircraft Production,* v. 9, April 1947, p. 123-126.

The camera is of British design and manufacture; ancillary equipment installed by Airspeed, Ltd., and operated successfully during the past year.

24-126. Designing of "Trouble-Free" Dies. C. W. Hinman. *Modern Industrial "Press",* v. 9, April 1947, p. 20.

A press fit assembling die.

24-127. The Distribution of Loads on Rivets Connecting a Plate to a Beam Under Transverse Loads. F. Vogt. *National Advisory Committee for Aeronautics Technical Memorandum No. 1134.* April 1947, 24 p.

A theoretical discussion with descriptions of methods of solution for various cases. Methods recommended for use in the design of light-alloy structures when the design load is likely to be above the proportional limit. (Reprinted from Report SME 3301, Oct. 1944, Aircraft Establishment, Farnborough, England.)

24-128. The Load Distribution in Bolted or Riveted Joints in Light-Alloy Structures. F. Vogt. *National Advisory Committee for Aeronautics Technical Memorandum No. 1135,* April 1947, 39 p.

Theoretical discussion which is applicable not only for loads below the limit of proportionality but also for loads above this limit. Methods illustrated by numerical examples. A summary of earlier theoretical and experimental investigations. (Reprinted from SME 3300, Oct. 1944, Aircraft Establishment, Farnborough, England.)

24-129. Compressive Strength Comparisons of Panels Having Aluminum Alloy Sheet and Stiffeners With Panels Having Magnesium Alloy Sheet and Aluminum Alloy Stiffeners. Norris F. Dow, William A. Hickman, and Howard L. McCracken. *National Advisory Committee for Aeronautics Technical Note No. 1274,* April 1947, 24 p.

Comparisons show that the composite magnesium-alloy, aluminum-alloy panels have higher structural efficiencies and buckling loads if the stiffeners are widely spaced.

24-130. Length Changes in Metals Under Torsional Overstrain. H. W. Swift. *Engineering,* v. 163, April 4, 1947, p. 253-257.

The assumption, that straight radial lines remain straight after torsion, if proven accurate, would justify the construction proposed by Nadai by means of which the stress-strain relationship could be derived graphically from the torque-twist curve. The investigation described arose from some experiments made on mild steel to test the validity of Nadai's construction, by comparing shear stress-strain curves obtained from solid bars by his construction with similar curves obtained from hollow specimens in which the stress distribution could be regarded as uniform. Details of the technique and the results obtained.

24-131. Battelle Reports on Field Survey. L. R. Jackson, H. M. Banta, and R. C. McMaster. *Drilling Contractor,* v. 3, April 15, 1947, p. 42-47, 55.

Following a visit to the Permian Basin fields of West Texas and New Mexico, the authors point out the advantages and disadvantages of using drill collars to reduce stresses, and analyze the use of sodium chromate as an inhibitor. They report on the use of internally-coated drill pipe and offer their conclusions and recommendations.

24-132. Hydraulic Control for Heavy Engine Lathe. *Product Engineering,* v. 18, May 1947, p. 94-95.

Design features of Hydratrol lathe.

24-133. Quick-Removable Fastener Redesigned. *Product Engineering,* v. 18, May 1947, p. 98-99.

Redesigned fastener is made in floating or rigid, flush or plus-flush types that open on a quarter-turn of the coin slot or wing heads. All parts are cadmium plated. Fastener is intended for joining metal sheets.

24-134. Typical Applications of the Bellows Unit in Control Assemblies. *Product Engineering,* v. 18, May 1947, p. 116-117.

Basic designs of bellows, and some of their applications in the field of temperature and pressure control.

24-135. New Torsion Rod Suspension Features Welded Construction. Given Brewer. *Automotive and Aviation Industries,* v. 96, May 1, 1947, p. 24-27, 84.

Stress analysis and road tests of light-vehicle springing system.

24-136. Tecnica Costruttiva dei Grandi Serbatoi di Alluminio. (Methods of Construction for Large Aluminum Vessels.) *Alluminio,* v. 15, Jan-Feb. 1947, insert, p. 1-30.

Summarizes information from Italy and foreign countries. Excellent detail drawings show good and bad designs for welding of various shapes. Pertinent properties of various commercial aluminum alloys. 13 ref.

24-137. Collapse Resistance of Pipes. W. F. Schaphorst. *Welding Engineer,* v. 32, May 1947, p. 85.

The external pressure which has a tendency to collapse a steel tube or pipe of specified length, diameter, and wall thickness.

24-138. Lubrication Considerations in Gear Design. *Machinery,* v. 53, May 1947, p. 145-153.

Emphasizes need for designer to consider the effect of speed and tooth loading on film-forming ability.

24-139. Mechanism for Imparting Oscillating Motion to Paper-Cutting Blade. Charles F. Smith. *Machinery,* v. 53, May 1947, p. 179-180.

Modified oscillating motion imparted to the cutter by design shown was found to be much more suitable for cutting paper than the action of a vertical guillotine-type cutter. The width of the strip is adjustable by ½-in. increments, and as many as 400 strips have been cut per minute.

24-140. Trailers. *Automobile Engineer,* v. 37, April 1947, p. 129-136.

More important design features embodied in Taskers trailers. Coupling, axle assemblies, suspension systems, jockey wheels, and braking systems. Manufacturing methods.

24-141. Unfired Cylindrical Vessels Subjected to External Pressure. F. V. Hartman. *Transactions of the American Society of Mechanical Engineers,* v. 69, May 1947, p. 337-343; discussion, p. 343-344.

Report of the progress of the Unfired Pressure Vessel Code of the A.S.M.E. Special Research Committee on Vessels Under External Pressure since 1943. New charts for determining the thickness of cylindrical unfired vessels subjected to external pressure when constructed of carbon or low-alloy steel, monel, "A" nickel, Inconel, aluminum (commercially pure grade) and aluminum-manganese alloy. Information for the steels and aluminums includes charts for vessels which operate at elevated temperatures. Proposed rules for the reinforcement of openings, testing of vessels, and odd-shaped vessels.

24-142. Computing Strength of Vessels Subjected to External Pressure. R. G. Sturm and H. L. O'Brien. *Transactions of the American Society of Mechanical Engineers,* v. 69, May 1947, p. 353-358.

Variables and considerations that must be treated when designing a pressure vessel for a collapsing load. Collapsing-pressure diagrams and the formula used in determining values. A method is presented which eliminates trial-and-error solutions by use

of appropriate charts based upon instantaneous moduli of elasticity. Calculations and charts are shown for "A" nickel and stainless steel 17-7.

24-143. Vibration Testing and Product Acceptability. Harrison Johnston. *Iron Age,* v. 159, May 15, 1947, p. 58-61.

Some of the possible consequences of excessive vibration, and the various types of testing equipment available, their ranges and typical applications.

24-144. Stress Analysis Research by Means of Brittle Coatings. August J. Durelli. *Frontier,* v. 10, March 1947, p. 7-9.

Techniques used.

24-145. The Equilateral Electric Strain Gage Rosette. Given Brewer. *Metal Progress,* v. 51, May 1947, p. 758-763.

A simplified graphical method in which three electric strain gages are arranged regularly about a point, giving an accurate estimate of the principal stresses and their directions.

24-146. Torsion Bar Springs. *Metal Progress,* v. 51, May 1947, p. 771-774.

Some metallurgical and design details showing how the spring designer and spring maker have combined the advanced knowledge of elastic action in hardened and overstressed steel to improve greatly the operating characteristics of heavy, track-laying vehicles, such as tanks and gun carriages.

24-147. Fourth Interim Report on the Investigation of the Welding of Ships' Structures. James Turnbull. *British Welding Research Association,* Aug. 1945, 3 p.

Results of 47 additional tests covering 12-in. bulb angles and 12-in. bulb plates with different types of bracket connection; and 12-in. tee stiffeners of different designs. Stress distributions, design details of specimens, and deflections under various loads.

24-148. A Moment Distribution Method for Rigid Frame Steel Structures Loaded Beyond the Yield Point. M. R. Horne. *British Welding Research Association,* Jan. 1946, 8 p.

Method for computing stresses due to flexure in a rigid steel frame, after the yield stress has been exceeded in a certain number of its members. Formulas are developed showing the joint rotations, stiffness factors, carryover factors, and joint translation factors for a beam of rectangular cross section at any stage of plastic deformation. A method for calculating the stresses in a steel frame which has been stressed beyond the elastic limit, and then unloaded, or reloaded with differing load concentrations.

24-149. Form Tools. (Continued.) William F. Walker. *Edgar Allen News,* v. 25, April 1947, p. 809-810.

Design of circular form tools. (To be continued.)

24-150. Drawing Die Problems and Formulas. Installment No. 2. James Walker. *Tool Engineer,* v. 18, May 1947, p. 18-23.

Sectional blank die construction; "breaking" the die; taper considerations; dinking dies; shallow draw and trim; forming and parting dies; die for press brake; two-stage forming die; operation of press brake for corrugating; two-stage hinge die. (To be continued.)

24-151. Weight Economy in Engineering Design. Walter A. Semmion. *Materials & Methods,* v. 25, May 1947, p. 59-62.

How choices of materials and designs based on the principles of weight economy can result in a much more efficient product and help reduce manufacturing costs.

24-152. Designing of "Trouble-Free" Dies. Part LXIX. C. W. Hinman. *Modern Industrial Press,* v. 9, May 1947, p. 20, 30.

Assembling of sheet metal parts.

24-153. Specifications and Method of Dimensioning Screw Holes and Washers for Broach Inserts and Holders. *Western Metals,* v. 5, May 1947, p. 36

Shown diagrammatically.

24-154. Allowances for 90° Bends in Sheet Steel. Parts III and IV. Alf J. Abrahamsen. *American Machinist,* v. 91, May 22, 1947, p. 155, 157.

Cutting sizes of sheet steel for various combinations in 10 to 24 gage material.

24-155. Roof Trusses With Welded Joints Tested by Jacking Against Each Other. *Engineering News-Record,* v. 138, May 29, 1947, p. 52-53.

Novel test program designed to determine the reliability of all-welded trusses used to support the roofs of General Electric's new research and manufacturing center near Syracuse, N. Y.

24-156. Designing Tools for Screw Machine Production. Part IX. C. W. Hinman and A. H. Adams. *Screw Machine Engineering,* v. 8, May 1947, p. 57-59.

Step corrections for circular tools; and top rake calculations for circular form tools.

24-157. Production of Hydraulic Equipment. Part I. *Aircraft Production,* v. 9 May 1947, p. 163-166.

British-made device used for aircraft hydraulic systems utilizes the compressibility of liquids at very high pressures—approx. 30,000 psi. Machining techniques used in its fabrication. (To be concluded.)

24-158. Some Experiments on the Distribution of Deflection and Stress in Thin Flat Plates Subjected to Practical Systems of Loading. (Concluded.) H. D. Conway and V. C. Davies. *Sheet*

Metal Industries, v. 24, May 1947, p. 993-997, 999.

From experiments on a uniformly loaded square plate on a single central support it was concluded that maximum deflection could be found approximately by treating the plate as a circular plate loaded with the same pressure and having the same diameter as the diagonal of the square plate. For a uniformly loaded square plate on four equidistantly spaced supports, minimum deflection was obtained when the center corner and midside deflections were the same.

24-159. The Design of Compound Cylinders for High-Pressure Service. W. R. Manning. *Engineering,* v. 163, May 2, 1947, p. 349-352.

Equations for use in the design of cylindrical high-pressure vessels. Results of the theoretical analysis are applied to a consideration of the A. O. Smith "Multi-Layer" system of construction. Results of tests on two of these vessels indicate little or no increase in ultimate strength compared to the simple cylinder, although the elastic strength is considerably improved.

24-160. Stress Concentration and Fatigue Failures. S. Timoshenko. *Engineer,* v. 183, May 9, 1947, p. 398-399; May 16, 1947, p. 421-422.

The various ways for reducing fatigue failure are illustrated by example of locomotive axles. (Condensed from paper presented at Institution of Mechanical Engineers, April 25, 1947.)

24-161. Stress Analysis by Polarized Light. *Engineer,* v. 183, May 23, 1947, p. 454-455.

Principles and methods applied in use of a British-made instrument for determining stress concentrations of parts Application to gears.

24-162. Welded Tank Fails at 960 Psi. *Welding Engineer,* v. 32, June 1947, p. 60.

Results of destructive test on a 24-in. cylindrical butane storage tank.

24-163. Unveil Plane Wheel Service Stresses With Laboratory Stresscoat Analysis. *SAE Journal,* v. 55, June 1947, p 26-28, 32.

A quick method of determining stress by a combination of dynamic loading and brittle lacquer coating leads to improved design of airplane wheels and brakes. (Excerpts from "The Experimental Determination of Strains in Aircraft Landing Wheels and Brakes," by Marvin H. Polzin. Presented at S.A.E. National Aeronautic Meeting on April 9, 1947.)

24-164. Plane Designer's Guide to 75S-T Aluminum Uses. *SAE Journal,* v. 55, June 1947, p. 59-62.

How to exploit fully the weight-saving possibilities of this alloy. Heat treatment and aging necessary to develop the maximum physical properties in 75S-T as well as its structural uses. Judicious use of 75S-T in redesigning the B-29 wing made it 16% stronger and 650 lb. lighter. (Excerpts from a paper "Use of 75S-T in Structural Applications," by George Snyder and Frank J. Crossland. Presented at S.A.E. National Aeronautic Meeting on April 9, 1947.)

24-165. How Photography Helps Production. Rupert Le Grand. *American Machinist,* v. 91, June 5, 1947, p. 101-116.

Photo layout in design and fabrication. Templets for inspection and machining. Photography speeds 3-dimensional layout. High-speed cameras probe mechanical secrets. Motion pictures need good planning. Photography in stress analysis.

24-166. Welded Machine Tools. F. Koenigsberger. *Welder,* v. 16, Jan-March 1947, p. 2-7.

Design considerations.

24-167. Gearing for Steel Mill Auxiliaries and Cranes. L. J. Collins. *Iron and Steel Engineer,* v. 24, May 1947, p. 73-79; discussion, p. 79-82.

Certain facts pertaining to the choice of pressure angles in the design of gear teeth.

24-168. Mechanism for Automatically Stopping Press When Stock Fails to Feed. F. H. Mayoh. *Machinery,* v. 53, June 1947, p. 201-202.

Blueprint shows design.

24-169. Welded Steel Construction for Large Motors. *Product Engineering,* v. 18, June 1947, p. 93.

Designed for simplicity of manufacture.

24-170. Metal Stampings in Small Lots at Reasonable Fabrication Cost. M. J. Mikulak. *Product Engineering,* v. 18, June 1947, p. 105-109.

Details of designing stampings for low-cost production with temporary or push-through dies. An example is cited showing comparative costs of an equivalent part made by different methods. Tolerances on stamped parts, assembly tolerances, and other design data.

24-171. Malleable Iron Castings. James H. Lansing. *Product Engineering,* v. 18, June 1947, p. 110-114.

Mechanical and physical properties of the standard grades of malleable iron and of pearlite and alloy malleable irons. Design data include recommended radii of fillets on ribs and sections, allowable rib and section thicknesses, and factors concerning the design of cored parts. Uses of malleable iron products.

24-172. Five Theories of Static Failure Explained and Compared. Charles Lip-

son. *Product Engineering*, v. 18, June 1947, p. 157-160.

Five theories of failure and how to select the right one. Results obtained using each theory.

24-173. Locking Fasteners. Harry Raech, Jr. *Machine Design*, v. 19, June 1947, p. 128-132, 184.

An analysis of self-locking fasteners now available for use in machine elements. Diagrams of a large number of different types.

24-174. Preferred Numbers. Reynolds Olsen Tjensvold. *Machine Design*, v. 19, June 1947, p. 133-136.

Advantages of using standard series of numbers when designing for production of a series of sizes of the same article.

24-175. Study of Dryer Operation to Determine Cause of Failures. H. M. Spring. *Paper Trade Journal*, v. 124, May 29, 1947, p. 104, 106, 108, 110.

Failures of cast-iron paper-mill dryer rolls. Use of stress-analysis techniques to determine the presence of dangerous stresses.

24-176. Coring: Its Influence on Die Casting Design. *Die Castings*, v. 5, June 1947, p. 24, 26, 43-45.

Use of cores to save metal and machining and to produce better castings.

24-177. Stress Investigations of Flat Welded-In Heads. H. M. Spring, Jr. *Mechanical Engineering*, v. 69, June 1947, p. 482-484.

Experiments on strain-gage, fatigue-endurance, and deflection-to-destruction techniques on a flat-head vessel constructed in accordance with the A.S.M.E. code for unfired pressure vessels indicate that the pressures allowed by the code are excessively conservative.

24-178. Large Deflections of Circular and Square Plates. H. D. Conway. *Philosophical Magazine*, v. 37, Nov. 1946, p. 756-767.

A mathematical analysis.

24-179. The Large Deflections of Rectangular Membranes and Plates. H. D. Conway. *Philosophical Magazine*, v. 37, Nov. 1946, p. 767-778.

A mathematical analysis.

24-180. Proof Loading—An Essential Non-Destructive Test. John C. New. *Industrial Radiography & Non-Destructive Testing*, v. 5, Spring 1947, p. 37-40.

Application of proof loading to a torpedo suspension band which must have enough elasticity to respond to changes in dimensions of the torpedo caused by presence or absence of 2800 psi. Both Stresscoat and the wire-resistance strain gage were used in stress analysis of the band.

24-181. Pressure Tubing for High Temperatures. *Mechanical Topics*, v. 10, Spring 1947, p. 6.

Chart for determining proper tube sizes and materials.

24-182. Stress-Strain Tester for Shaped Diamond Tools. *Industrial Diamond Review*, v. 7, May 1947, p. 135.

A brief description of the above device.

24-183. The Construction of Large Accurate Involute Curves. Part II. C Attwood. *Machinery (London)*, v. 70, May 29, 1947, p. 561-564.

Methods used in gear-tooth design.

24-184. Stress Analysis. *Metal Industry*, v. 70, May 30, 1947, p. 399-400.

Utilization of plane-polarized light in study of plastic models of machinery components to check design serviceability and safety before beginning production.

24-185. The Importance of Pre-Spring Engineering. *Mainspring*, v. 12, June 1947, p. 2-5.

Example shows the importance of making design calculations before picking a spring for a job.

24-186. Analysis of Stresses in Unsymmetrical Pipe Frame. Jesse Yeakel. *Petroleum Refiner*, v. 26, June 1947, p. 113-115.

As a sequel to an article in the March issue, solutions are developed for two frames of somewhat more complicated shape than the U-bends discussed in the former article.

24-187. Car Frame and Crankcase Improved by Brittle Coating Tests. *Automotive Industries*, v. 97, July 1, 1947, p. 31, 60.

Use of Stresscoat by Packard to locate the weak spots in convertible bodies and also in the crankcase section of the eight-cylinder engine.

24-188. Designing Tools for Screw Machine Production. Part X. *Screw Machine Engineering*, v. 8, June 1947, p. 55-57.

Insert tools, two-piece tools, grinding arbor, grinding gage for sharpening, and corrected tool diameters for angles and radii.

24-189. Photo-Elastic Stress Analysis. *Aircraft Production*, v. 9, June 1947, p. 232.

Use of polariscope and transparent test specimens.

24-190. Diaphragm Control Valves. Arthur J. Koch. *Chemical Engineering*, v. 54, June 1947, p. 207, 208, 210, 212, 214, 216, 218.

Construction materials and designs for corrosive and high-temperature service in the chemical industries.

24-191. Problems in the Mechanical Design of Gas Turbines. Ronald B. Smith.

Journal of Applied Mechanics, v. 14 *(Transactions American Society of Mechanical Engineers*, v. 69*)*, June 1947, p. A99-A102.

A method of approach which has been successfully applied by the Elliott Co., Jeannette, Pa. Designs are based on the maximum-stress theory of failure, and the evaluation of working stress is made on the basis of the stress-to-rupture test in simple tension at elevated temperatures.

24-192. Correlation of Tension Creep Tests With Relaxation Tests. E. P. Popov. *Journal of Applied Mechanics*, v. 14 *(Transactions American Society of Mechanical Engineers*, v. 69*)*, June 1947, p A135-A142.

A satisfactory estimate of a relaxation graph may be obtained from the usual tension-creep curves. Validity of the method is demonstrated on the basis of experimental agreement between calculated and test results. 16 ref.

24-193. Combined-Stress Tests on 24S-T Aluminum-Alloy Tubes. W. R. Osgood. *Journal of Applied Mechanics*, v. 14 *(Transactions American Society of Mechanical Engineers*, v. 69*)*, June 1947, p. A147-A153.

Tests were made on five 24S-T aluminum-alloy tubes, 1¾ in. i.d. × 0.05 in. thick. The ratios of circumferential (hoop) stress to axial stress were 0, ½, 1, 2, and infinity. Results are presented in the form of two sets of stress-strain curves for each ratio of stresses, namely, maximum shearing stress plotted against maximum shearing strain, and octahedral shearing stress plotted against octahedral shearing strain.

24-194. Buckling Under Locally Hydrostatic Pressure. B. J. Aleck. *Journal of Applied Mechanics*, v. 14 *(Transactions American Society of Mechanical Engineers*, v. 69*)*, June 1947, p. A163-A164.

Discusses paper by G. H. Handelman, published in Sept. 1946 issue. Analysis is extended to the case where an end load is present in addition to locally hydrostatic pressure.

24-195. Concentrated-Force Problems in Plane Strain, Plane Stress, and Transverse Bending of Plates. J. J. Polivka. *Journal of Applied Mechanics*, v. 14 *(Transactions American Society of Mechanical Engineers*, v. 69*)*, June 1947, p A164-A165.

Brief discussion of paper by P. S. Symonds, published in Sept. 1946 issue.

24-196. Calculation of Stress in Crane Hooks. A. O. Gates. *Journal of Applied Mechanics*, v. 14 *(Transactions American Society of Mechanical Engineers*, v. 69*)*, June 1947, p. A165.

Brief discussion of paper by A. M. Wahl, published in Sept. 1946 issue.

24-197. General Stress-Strain Laws of Elasticity and Plasticity. William Prager. *Journal of Applied Mechanics*, v. 14 *(Transactions American Society of Mechanical Engineers*, v. 69*)*, June 1947, p. A168.

Discusses paper by A. Gleyzal, published in Dec. 1946 issue.

24-198. Designing of "Trouble-Free" Dies. Part LXX. Assembling Studs in Crank-Arms. C. W. Hinman. *The Modern Industrial "Press"*, v. 9, June 1947, p. 20, 34.

Dial-feed press tool automatically stakes round stud on crank arm.

24-199. Bimetal Casting Used in Auto Camshaft. *Iron Age*, v. 159, June 12, 1947, p. 51.

British-built Ford motor utilizes a separate casting for the gear with 1.3% C, plus Si-Cr alloy material, which is cast with two crossbars through the center. The bushing is then heat treated to a Brinell hardness of 187 to 241 for machinability. Finally, gray iron is poured into the center of the bushing and is fixed in place by the two crossbars.

24-200. Notch Effects in High Strength Aluminum Alloys. *Iron Age*, v. 159, June 12, 1947, p. 52-56.

Relative notch sensitivities of aluminum alloys 14S-T, 24S-T, and 75S-T were evaluated. Results are presented from the standpoints of both stress and strain notch sensitivity. Effects of holes in large structural members.

24-201. Calculations Improve Shrink Fits on Large Gears and Wheels. N. N. Sawin. *American Machinist*, v. 91, June 19, 1947, p. 142, 144-145.

Calculations and measurements made at the Skoda Works, during 1942 and 1943, in the course of the manufacture of several pairs of heavy driving gears for rolling mills.

24-202. Developments in Casing Standards and Design. John Wais, Jr. *Petroleum Engineer*, v. 18, June 1947, p. 106, 108, 111.

Thread design, effect of notching and flattening, high-pressure testing, calculation of stresses, and design of high-strength casing joints in oil-well casing.

24-203. Arc Welded Structural Steelwork. *Transactions of the Institute of Welding (B.W.R.A. Supplement)*, v. 10, April 1947, p. 26-29.

Recommendations for the design, fabrication, and erection of welded stanchion bases, caps, and joints.

24-204. Numerical Methods for the Calculation of Elastic Instability. Bruno A. Boley. *Journal of the Aeronautical Sciences*, v. 14, June 1947, p. 337-348; discussion, p. 348-350.

Three numerical methods for the evaluation of buckling loads requiring

an operations table similar to that used in Southwell's relaxation procedure. The procedure to be followed in each method. Experiments on sheet and stringer combinations, the results of which are in good agreement with those obtained from each of the three methods of calculation.

24-205. Considerations Involved in the Accurate Development of Templets. (Continued.) A. Dickason. *Sheet Metal Industries,* v. 24, June 1947, p. 1193-1195, 1201.

A number of calculation methods for aircraft parts. Includes diagrams. (To be continued.)

24-206. Welded Bases for Metal Processing Equipment. *Materials & Methods,* v. 25, June 1947, p. 130-131.

Advantages of the above. (Condensed from *Machines et Metaux,* v. 31, Jan. 1947, p. 3-7.)

24-207. Welded Brake Straps for Excavators. William C. Black. *Welding Journal,* v. 26, June 1947, p. 494-496.

The application of scientific methods to the redesign of a brake strap used on open-pit mining shovels, to change from riveted to welded construction.

24-208. Arc Welded Steel Construction Improves Production of Meat Packing Machinery. R. H. Davies. *Welding Journal,* v. 26, June 1947, p. 514.

Design of welded saddles for dry-rendering cooker.

24-209. Mixed Boundary Conditions in the Relaxational Treatment of Biharmonic Problems (Plane Strain or Stress). L. Fox. *Proceedings of the Royal Society,* v. 189, June 3, 1947, p. 535-543.

Relaxation methods already have been applied to the solution of four problems. Here the method is adapted to the case in which the two types of boundary condition are mixed, where photoelastic methods are difficult to apply. Two examples are treated by relaxation methods. Results obtained indicate that this method may be a valuable alternative in engineering problems.

24-210. The High-Pressure Gasholder. M. Noone and A. G. Grant. *Gas Times,* v. 51, June 14, 1947, p. 376-379.

Design, construction, and testing of holders with 6000 to 500,000 cu.ft. capacities and maximum working pressures of 40 to 200 psi.

24-211. Stress Analysis of Passenger Cars. K. F. Nystrom. *Railway Age,* v. 122, June 27, 1947, p. 1294D220-1294D229.

A stronger and lighter car than the present A. A. R. recommended design can be built.

24-212. How to Avoid Failures of Brass Due to Season Cracking. *Electrical Manufacturing,* v. 40, July 1947, p. 100-103, 186, 188, 190.

Season and stress-corrosion cracking can be avoided by selection of materials, proper working and annealing, and control of service conditions.

24-213. Welded Buildings From Used Pipe. *Linde Tips,* v. 26, July 1947, p. 87-88.

Design and construction of low-cost structures.

24-214. Wood-to-Metal Adhesives. Thomas D. Perry. *Plastics,* v. 7, July 1947, p. 21-22, 24, 68.

Applications and properties of plywood-metal laminates. Design details.

24-215. Temporary Tooling for Metal Luggage. *Tool & Die Journal,* v. 13, July 1947, p. 88, 90, 94, 95, 106C.

Special design for magnesium-sheet luggage, using brake equipment.

24-216. Stress Determination by Brittle Coatings. Greer Ellis. *Mechanical Engineering,* v. 69, July 1947, p. 567-571.

24-217. Electromagnetic Vibration Exciter and Calibrator. *Product Engineering,* v. 18, July 1947, p. 92-94.

Details of an exciter for dynamic stress analysis covering low and high-frequency ranges.

24-218. Redesign for Projection Welding Speeds Stamping Assembly. *Product Engineering,* v. 18, July 1947, p. 95.

Bosses for projection welding serve as locater pins to position parts in welding of redesigned roller skate.

24-219. Special Fasteners Cut Assembly Time. *Product Engineering,* v. 18, July 1947, p. 96-98.

Use of 44 sheet-metal fasteners of 14 different types to assemble the Motorola gasoline car heater.

24-220. Vibration Testing Technique and Its Use in Improving Designs. John A. Dickie. *Product Engineering,* v. 18, July 1947, p. 115-119.

Use of shake testing to check the dynamic behavior of machines and structures at operating conditions. Forced-vibration methods for determining the fatigue strength of individual parts.

24-221. Nomogram for Polar Moment of Inertia by Suspension. Herbert F. Bariffi. *Product Engineering,* v. 18, July 1947, p. 177.

How to determine polar moment of inertia for an irregular mass by experimental measurements plus use of nomogram.

24-222. Stress Analysis by X-Ray Diffraction. Herbert R. Isenburger. *Machinery,* v. 53, July 1947, p. 167-168.

Back-reflection method is only means of accurately analyzing existing stresses without measuring unstressed structure.

24-223. Speed Reducer With Wabble-Gear Mechanism. A. W. Jansson. *Machinery,* v. 53, July 1947, p. 178-180.

Mechanism used to drive tumbling barrels and similar equipment.

24-224. How to Design Carbide Blanking Dies. Earle Glen. *American Machinist,* v. 91, July 17, 1947, p. 137-139.

Advantages of carbide blanking dies and reasons for these advantages. Methods of attaching carbide die section. Other design considerations.

24-225. Progress in the Design of Elevated Steel Tanks. Donald A. Leach. *Journal of the American Water Works Association,* v. 39, July 1947, p. 651-658.

Illustrated.

24-226. Welding Couplings With Channels for Hydraulic Testing of Joints. A. I. Kratman. *Avtogennoe Delo (Welding),* no. 1, 1947, p. 30. (In Russian.)

Design arrangement for this type of test. It is especially useful for determining the quality of welds in high-pressure vessels.

24-227. Several New Problems in Structural Mechanics of Shells and Thin-Wall Construction. V. Z. Vlasov. *Bulletin of the Academy of Sciences of U.S.S.R. (Section of Technical Sciences),* no. 1, 1947, p. 27-52. (In Russian.)

New theory, which is developed mathematically, permits solution of complicated problems in thin-wall construction. Application to ship building and to aircraft wing structures. 10 ref.

24-228. Eine Neue Ausfuhrung der Abzweigrohre von Druckleitungen. (A New Design for Branching Pipes for High-Pressure Applications.) E. Schmidt. *Schweizer Archiv,* v. 13, no. 5, 1947, p. 141-147.

Strengthening the parts of branching high-pressure pipes which are most subject to wear, by welding on additional sheet. A standard for measurements has been set up on the basis of pressure tests on two model pipes.

24-229. Equivalent Spur and Helical Gears. Carl A. Johnson. *Machine Design,* v. 19, July 1947, p. 155.

Table facilitates replacement of spur by helical gears. One to seven choices of standard, normal diametral pitch and helix angle which will produce a helical gear with a standard diametral pitch in the plane of rotation the same as that of the spur gear replaced.

24-230. Fundamentals of Machine Design Engineering. D. V. Waters. *Tool Engineer,* v. 18, July 1947, p. 23-28.

A few of the engineering fundamentals which underlie all successful machine designs and some mechanisms which illustrate these principles.

24-231. Mechanical Testing. Part II. A Review of Methods of Structure-Loading. E. R. Arbon. *Aircraft Production,* v. 9, July 1947, p. 267-269.

24-232. Pattern Development of Sheet Metal Structures for Vitreous Enameling. W. Cookson. *Sheet Metal Industries,* v. 24, July 1947, p. 1389-1394, 1404.

Procedures for templet development and design. 12 ref.

24-233. Arc Welded Fabrication is Lowering Cost, Extending Life of Modern Valves. Hugo H. Stahl. *Welding Journal,* v. 26, July 1947, p. 620-621.

An all-welded small-size valve body, gate type, for high-pressure service developed by Manning, Maxwell and Moore, of Boston, Mass., is offered in support of the contention that a weldment can compete with small-sized intricate casting on a cost basis, even on a mass production basis.

24-234. Converting Partial Rotary to Sliding Motion. I. Cohen. *Machinery (London),* v. 71, July 3, 1947, p. 17.

A device in a change gear mechanism to operate a sliding fork by means of a lever in a plane at right angles to path of fork.

24-235. Compressed Air Clamping Device. *Machinery (London),* v. 71, July 3, 1947, p. 20.

Construction and advantages of the device.

24-236. Proper Use of Spring Materials. F. P. Zimmerli. *Society of Automotive Engineers, Inc., Preprint,* 1947, 18 p.

The properties and applications of the various spring designs and materials, not only body-suspension springs, but all other types of ferrous and non-ferrous springs.

24-237. The High-Pressure Gasholder. M. Noone and A. G. Grant. *Institution of Gas Engineers, London, Copyright Publication No. 314,* 1947, 27 p.

Design and construction of high-pressure gasholders. Requirements of welded construction. Chart shows dimensions for a wide range of capacities and pressures.

24-238. Charts for the Minimum-Weight Design of Multiweb Wings in Bending. Evan H. Schuette and James C. McCulloch. *National Advisory Committee for Aeronautics Technical Note No. 1323,* June 1947, 39 p.

A method for calculation of the buckling stress in a multiweb wing in bending and design charts based on this method for the minimum-weight design of multiweb wings of 24S-T aluminum-alloy sheet, extruded 75S-T aluminum alloy, and extruded O-IHTA Mg alloy.

24-239. Assembly and Welding of a Spherical Regeneration Tank 12.98 Meters in Diameter. E. D. Lonsky. *Avto-*

gennoe Delo (Welding), no. 2, 1947, p. 11-16. (In Russian.)

Several diagrams and photographs.

24-240. Some Investigations of the General Instability of Stiffened Metal Cylinders. Part VIII. Stiffened Metal Cylinders Subjected to Pure Torsion. Louis G. Dunn. *National Advisory Committee for Aeronautics Technical Note No. 1197*, May 1947, 51 p.

Details of research conducted at California Institute of Technology using a combined bending and torsion machine and wire strain-gage equipment.

24-241. Brittle Lacquer Stress Analysis. Part I. E. Barber. *Engineering Materials*, v. 5, June 1947, p. 59-61.

Outlines the method. (To be concluded.)

24-242. Welding for Economy, Flexibility, Appearance. Part II. Textile Machine. C. A. McClean. *Industry and Welding*, v. 20, July 1947, p. 28-29, 73-75.

Principles demonstrated can be applied to many types of machinery. Cutting and welding have reduced weight 45%, increased strength, and eliminated machining, drilling, milling, and grinding operations. Stainless steel rolls have replaced copper-plated black iron rolls; and bearing housings, formerly cast, are now flame cut and arc welded.

24-243. Designing of "Trouble-Free" Dies. Part LXXI. Assembling Sheet Metal Parts. C. W. Hinman. *Modern Industrial "Press"*, v. 9, July 1947, p. 20, 22.

24-244. The Design of Compound Cylinders for High-Pressure Service. *Engineering*, v. 164, July 4, 1947, p. 16.

T. McLean Jasper discusses W. R. D. Manning's paper in May 2 issue, presenting theories and information based on his experiences, concerning failure of metals.

24-245. Does Torque Weaken Bolts? H. O. Hill. *Engineering News-Record*, v. 139, July 24, 1947, p. 78-79.

Tests made on bolts show that full strength in tension is retained, even when torque is applied, unless the torque loading is carried to bolt failure. (Reprinted from *Fasteners*.)

24-246. Forging Die Design. John Mueller. *Steel Processing*, v. 33, July 1947, p. 424-426, 430, 436.

The die block and its preparation for use.

24-247. Photo-Projection Inspection and Layout. C. J Kettler. *Iron Age*, v. 160, July 31, 1947, p. 45-49.

A new, simple, and rapid method of inspecting and laying out intricate castings involves the accurate projecting of layout drawings by optical means onto the surface of a casting.

24-248. How to Design Carbide Draw Dies. Earle Glen. *American Machinist*, v 91, July 31, 1947, p. 101-103.

Types of draw die nibs. Dimensions depart somewhat from those of steel dies. Manufacturing tolerances; steps in assembly; shrink fit allowances.

24-249. Crankshaft Bending Vibration. E. Forest Critchlow and W. T. Bean, Jr. *SAE Quarterly Transactions*, v. 1, July 1947, p. 380-388.

Improper evaluation of bending vibration during endurance tests is reported to be the cause of most of the recent crankshaft failures occurring during flight in low-horsepower engines. A simple bending pickup device is suitable for studying crankshaft bending vibration qualitatively; good agreement with results from strain-gage equipment.

24-250. Philosophy for Design of Sandwich-Type Structure. John F. Korsberg. *SAE Quarterly Transactions*, v. 1, July 1947, p. 408-414.

Preprint previously abstracted.

24-251. Experiences of an Aircraft Manufacturer With Sandwich Material. *SAE Quarterly Transactions*, v. 1, July 1947, p. 415-428.

Preprint previously abstracted.

24-252. Sandwich Materials: Metal Faces Stabilized by Honeycomb Cores. W. W. Troxell and H. C. Engel. *SAE Quarterly Transactions*, v. 1, July 1947, p. 429-440.

Preprint previously abstracted.

24-253. Metallurgical and Structural Investigation of Steel Castings for Aircraft. L. W. Smith and L. D. Morris. *Transactions of American Society for Metals*, v. 38, 1947, p. 848-874; discussion, p. 874-878.

Program included determination of chemical and physical properties, determination of quality by various inspection methods, proof testing, fatigue and repeated load cycling, and static ultimate tests. Results indicate that sound castings can be obtained and that they can be used in aircraft primary structures to supplement and supersede present components.

24-254. Column Characteristics of Sandwich Panels Having Honeycomb Cores. W. W. Troxell and H. C. Engel. *Journal of the Aeronautical Sciences*, v. 14, July 1947, p. 413-420; discussion, p. 420-421.

The column characteristics of panels having metal faces and honeycomb cores. Compressive behavior is determined by the elastic properties of the face metal and by the shear rigidity of the stabilizing medium. Comparison of honeycomb panels with all-metal construction shows the sandwich to be the less efficient simple column.

24-255. High-Speed Compression Tests on Copper. M. Greenfield and E. T.

Habib. *Journal of Applied Physics,* v. 18, July 1947, p. 645-650.

Dynamic shortening of ½-in. length copper cylinders is achieved by striking them with a hardened steel projectile at high velocities. The average strain rate was about 1200 per sec. Energy per unit volume absorbed by the copper is plotted against strain. A true stress logarithmic strain curve is computed. This curve is compared with a similar curve derived from high-speed tests on copper in tension.

24-256. Stresses in Glass-to-Metal Bead Seals at Room Temperature. G. D. Redston and J. E. Stanworth. *Journal of the Society of Glass Technology,* v. 30, Aug-Oct. 1946, p. 201-216.

A photo-elastic study was made of the distribution of the retardations due to axial stresses and to radial and hoop stresses in bead seals. Seals of varying glass-metal radius ratio were tested. Observed distributions of retardation agreed substantially with those derived from mathematical theory. Direct stress determinations however, were unreliable with seals of high glass-metal radius ratio, and also with short seals.

24-257. The Effect of Heat Treatment in Different Atmospheres on the Stress in Tungsten-to-Glass Seals. M. Manners. *Journal of the Society of Glass Technology,* v. 30, Aug-Oct. 1946, p. 217-238.

Effect of heat treatment in air and hydrogen on the longitudinal stress at the glass-to-metal boundary of cylindrical single-wire seals, and of the relationships between stress and time, and stress and temperature for "oxide" and "oxide-free" seals. Observed changes in stress were correlated with changes in physical and chemical conditions at the interface.

24-258. Generation of the Conic Sections With Machine Tools. R. T. Hinkle. *Product Engineering,* v. 18, Aug. 1947, p. 162-165.

How theorems from projective geometry can be duplicated by kinematic linkages for the generation of the ellipse, hyperbola, and parabola. Basic machine dimensions are analyzed and the conversion of design dimensions of parts into machine settings for production.

24-259. Limitations on Precision Cast Parts. Nicholas J. Grant. *Iron Age,* v. 160, Aug. 7, 1947, p. 62-66.

A series of investigations made on cast turbine-rotor blades which indicate that the performance of certain extreme sizes and shapes of blades cannot be entirely evaluated on the basis of creep and rupture tests.

24-260. Welding as Applied to Military Bridging. R. A. Foulkes. *Transactions of the Institute of Welding,* v. 10, June 1947, p. 78-89; discussion, p. 89-91.

The problems facing the designer of military bridges; the differences in the requirements of civilian and military design. The part played by welding.

24-261. Design and Cost of Welded Structures. E. C. Moore. *Transactions of the Institute of Welding,* v. 10, June 1947, p. 92-96.

Machine parts such as machine tool beds and columns, press heads and bases, guillotine shear frames, hammer columns, and similar constructions produced by welding.

24-262. Transverse Vibrations of Bars and Fatigue Fractures. P. Mathieu. *Engineers' Digest (American Edition),* v. 4, July 1947, p. 330-334.

Theoretical mathematical developments of two cases: free vibrations of a bar fixed at one end, especially vibrations caused by shock; and transverse vibrations of a tapered bar. (Concluded.) (Translated and condensed from *Schweizer Archiv,* v. 12, Nov-Dec. 1946, p. 329-338, 361-372.)

24-263. Performance Tests of Wire Strain Gages. Part V. Error in Indicated Bending Strains in Thin Sheet Metal Due to Thickness and Rigidity of Gage. W. R. Campbell and A. F. Medbery. *National Advisory Committee for Aeronautics Technical Note No. 1318,* July 1947, 11 p.

Results of tests for 15 types of single-element multistrand wire strain gages. In most cases the indicated extreme fiber-bending strain was greater than the actual strain.

24-264. Utilizing Mechanical Properties in Die Casting Design. Part V. Members Subjected to Repeated or Fatigue Loads. Joseph Marin. *Die Castings,* v. 5, Aug. 1947, p. 22, 25-26, 28.

Improved product design based on a thorough consideration of mechanical properties and stress analysis.

24-265. Riveted Assemblies. H. K. Barton. *Die Castings,* v. 5, Aug. 1947, p. 15-16, 45-48.

Some of the factors to consider in design.

24-266. Materials & Methods Manual 29: Screw Machine Products. T. C. Du Mond. *Materials & Methods,* v. 26, Aug. 1947, p. 103-110.

There are relatively few limitations on screw machine products if their design conforms to a few basic specifications. A wide range of materials is suited to machining by this process. Economics of screw machine products, and Swiss automatic products.

24-267. Designing Forming Dies Along Natural Flow Lines. Charles O. Herb. *Machinery,* v. 53, Aug. 1947, p. 131-136.

How forming dies for drop-hammers and power presses are developed by the Sol-A-Die process to eliminate thinning of sheet-metal sections.

24-268. Design Charts for Flat Compression Panels Having Longitudinal Extruded Y-Section Stiffeners and Comparison With Panels Having Formed Z-Section Stiffeners. Norris F. Dow and William A. Hickman. *National Advisory Committee for Aeronautics Technical Note No. 1389,* Aug. 1947, 76 p.

For 24S-T (bare sheet) and 75S-T (Alclad sheet) aluminum-alloy panels. Comparisons are made among panels designed from these charts and panels designed from other design charts.

24-269. How to Apply the Formula for Involute Sliding. Ben Bloomfield. *American Machinist,* v. 91, Aug. 14, 1947, p. 121-122.

Use of formula. Calculations for four examples.

24-270. New Lock Joint for Sheet Metal Structures. *Iron Age,* v. 160, Aug. 14, 1947, p. 80.

Also in *Sheet Metal Industries,* May 1947. See Item 22-282.

24-271. Designing Tools for Screw Machine Production; Part XII. Roy M. Spaulding. *Screw Machine Engineering,* v. 8, Aug. 1947, p. 71-74.

Flat form tools; top-rake for flat tools: the four steps taken in compiling the necessary calculations.

24-272. Redesign Increases Mill Motor Ratings. C. B. Hathaway. *Iron Age,* v 160, Aug. 21, 1947, p. 78-79.

Careful redesign of mechanical and electrical components, especially of the armature, bearings and bearing housings, and field coils, has made it possible to produce a line of mill motors with the ratings reduced one frame size. There is no change in the mounting dimensions or shaft extension for a given frame size. A new type 100-hp. 550 v. motor.

24-273. Welded Girder Sustains High Stresses in Test at 0° F. La Motte Grover. *Engineering News-Record,* v. 139, Aug. 21, 1947, p. 90-91.

The fourth of a series of six, 9-ton, welded steel box girders, which was subjected to a static load test at 0° F. deflected nearly 9 in. on a 22-ft. span before it fractured. The modulus of rupture was computed to be 80,000 psi. Part of an investigation to determine the effect upon the capacity of a welded structural member of severe geometrical constraint against ductile behavior.

24-274. Design Progress in 1946. F. B. Dahle. *Metals Review,* v. 20, Aug. 1947, p 5-7, 9.

A comprehensive survey of recent technical literature reflecting metallurgical aspects of design problems. Based on the A.S.M. Review of Current Metal Literature. Covers aviation design, automotive equipment, railroads and equipment, stresses and strains, casting, forging and stamping, tools and fixtures, building and structures, and fastening by welding, riveting and bolting.

24-275. Metallurgical Design and Industrial Applications. *Metals Review,* v. 20, Aug. 1947, p. 11, 13, 15, 17, 19, 21, 49.

Product manufacturers tell how and why metals are used in various ways. Tools of the designer; stress analysis equipment; materials; fabricating methods; assembly and finishing; design of mechanical elements; power units and electrical equipment; fasteners; light metal applications; miscellaneous product applications.

24-276. Transverse Vibrations of Bars and Fatigue Fractures. P. Matthieu. *Engineers' Digest (American Edition),* v. 4, June 1947, p. 273-277. (To be continued.)

Fundamental mathematical analyses were made to determine the reasons for certain fatigue failures of propeller and steam-turbine blades and of rack bars of water power plants. The fractures were caused by periodic forces acting on, but not in resonance with, the blades. (Translated and condensed from *Schweizer Archiv,* v. 12, Nov. 1946. p. 329-338; Dec. 1946, p. 361-372.)

24-277. Some Engineering and Design Considerations in the Utilization of Ordinary and High-Strength Steels. William B. Brooks. *Welding Journal,* v. 26, Aug. 1947, p. 665-669.

Measurement of ductility; notch bar testing; effect of loading velocity; effect of temperature; significance of the notch bar test; influence of thickness; fatigue; influence of corrosion in fatigue. 18 ref.

24-278. Comment on Recent Trends in Concepts of Design for Welded Steel Structures. G. M. Boyd. *Welding Journal,* v. 26, Aug. 1947; discussion, p. 693-695.

Significance of box girder tests when studied against the background of the Charpy V-notch values. Comments on residual stresses; drop hammer tests; fatigue tests; plastic theory. Discussion of paper by La Motte Grover in November 1946 issue. 10 ref.

24-279. Report on the Fracture of Metals. Part I. Maxwell Gensamer, Edward Saibel and John T. Ransom; **Part II.** Maxwell Gensamer, Edward Saibel and Robert E. Lowrie. *Welding Journal,* v. 26, Aug. 1947, p. 443s-484s.

Part I surveys the present knowl-

edge of the laws and fundamental mechanism of fracture in terms of the flow and fracture strength concepts. 271 ref. Part II discusses recent work and states three new problems of importance in determining the fracture behavior of metals. 52 ref.

24-280. **Brittle Lacquer Technique.** Herbert Dobkin. *Steel,* v. 121, Sept. 1, 1947, p 70-71, 98-99.

Tests prove value of applying experimental methods to aid in solution of complicated analytical problems involving parts subjected to extremely high centrifugal stresses.

24-281. **The High-Pressure Gasholder.** M. Noone and A. G. Grant. *Gas Journal,* v. 251, Aug. 13, 1947, p. 364-366.

Design principles, especially for welded construction, and pressure-test procedures. (To be continued.)

24-282. **Orientation of Strain Gages in Stress Analysis.** A. W. Rankin. *General Electric Review,* v. 50, Sept. 1947, p. 14-21.

The basic laws of stress and strain in a condensed form, with particular emphasis on the laws of strain. How to use these basic laws to show how strain gages should be applied, in number and orientation, so that the strain at a given point can be determined completely. How to combine the strain values so obtained.

24-283. **A New Fatigue Strength Damping Criterion for the Design of Resonant Members.** Joseph Marin and F. B. Stulen. *Journal of Applied Mechanics,* v. 14 (*Transactions of the A.S.M.E.,* v. 69), Sept. 1947, p. A209-A212.

A theoretical analysis shows that the load resistance of resonant members is a function not only of the fatigue strength but also of the damping constant and modulus of elasticity of the material. Test data on various materials show that the load resistance of a vibrating member may be appreciably changed by a correct selection of the material when this new design criterion is used. Data for vibrating beams and plates subjected to both concentrated and distributed resonant forces; other applications.

24-284. **Making the Most of Pressed Metal in Design.** *Electrical Manufacturing,* v. 40, Sept. 1947, p. 94-97, 156.

Possibilities in the replacement of machined castings are illustrated by descriptions of the fabrication procedures and illustrations of a number of pressed metal products.

24-285. **Brittle Lacquer Stress Analysis. Part II.** E. Barber. *Engineering Materials and Processes,* v. 5, Aug. 1947, p. 87-89.

Concluded.

24-286. **Modern Engineering Stress Analysis.** *Engineering Materials and Processes,* v. 5, Aug. 1947, p. 94-97.

Use of the polariscope.

24-287. **Photo-Elastic Stress Analysis.** *Steel,* v. 121, Sept. 8, 1947, p. 84, 86.

Use in British gear works.

24-288. **Sound Engine Design Thwarts Parts Fatigue.** *SAE Journal,* v. 55, Sept. 1947, p. 44-45.

Design changes in airplane engine parts to provide proper geometry, thus reducing stress concentration. Improper machining also may result in fatigue failure. (Based on "Endurance—A Criterion of Design", by W. T. Bean, Jr.)

24-289. **Jig and Fixture Designs.** Robert Mawson. *Tool & Die Journal,* v. 13, Sept. 1947, p. 80-82.

A multiple type drilling jig; milling fixture for a locking lever.

24-290. **Refrigerator Door Tool Design Simplified.** G. M. Bleakley. *American Machinist,* v. 91, July 31, 1947, p. 88.

Simplified design method, using an approximate arithmetical formula for calculating dished surfaces.

24-291. **Prefabricated Shapes for Magnesium Truck Bodies.** *Automotive Industries,* v. 97, Sept. 15, 1947, p. 31.

Design drawings and description.

24-292. **Design Considerations for Carbide Sheet Metal Dies.** Earle Glen. *Steel,* v. 121, Sept. 22, 1947, p. 75-76, 109.

Prime construction features of various blanking and progressive dies and of blanking punches.

24-293. **Pattern for a Tapering Tee.** O. W. Kothe. *Sheet Metal Worker,* v. 38, July 1947, p. 49-50.

Diagrams for application of a tapering tee to a cylindrical pipe with elbow part of tee facing in a diagonal direction.

24-294. **Determination of Thickness of Unfired Steel Pressure Vessels.** Coleman J. Major. *Chemical Industries,* v. 61, July 1947, p. 106, 108, 110.

Nomographs for determining safe thicknesses, in accordance with the 1946 A.S.M.E. Code, for cylindrical shells and seamless dished heads.

24-295. **Design of Flanged Joints.** S. Labrow. *Institution of Mechanical Engineers Proceedings,* v. 156, no. 1, 1947, p. 66-70; discussion, p. 70-73.

Basis of design adopted by one firm to insure consistency over a wide range of pressures and sizes. Table on gasket factors and yield values for various materials including metals, asbestos, rubbers, and fabrics, and one on effective gasket width.

24-296. **The Bending Strength of Materials With a Nonlinear Stress-Strain**

Curve. S. S. Gill. *Aircraft Engineering*, v. 19, July 1947, p. 212-216.

A number of curves for finding the position of the neutral axis and the failing bending moment.

24-297. Elastic and Plastic Bending of Beams. Tsun Kuei Wang. *Journal of the Aeronautical Sciences*, v. 14, July 1947, p. 422-432.

A method for analyzing fiber stresses of beams which includes the full effect of nonlinear stress-strain characteristics of materials throughout the elastic and plastic range. Various shaped cross sections commonly encountered in aircraft practices. 10 ref.

24-298. Some Common Developments Simplified: Labor-Saving Formulas for Cylindrical Pipe Subjects. J. B. Clegg. *Sheet Metal Industries*, v. 24, Sept. 1947, p 1836-1839.

Layout of simple elbows, segment elbows, roof plate apertures, and ellipses.

24-299. Developments in the Design of Turning and Facing Tools. *Machinery Lloyd (Overseas Edition)*, v. 19, Aug. 30 1947, p. 79-80.

24-300. Designing of "Trouble-Free" Dies. Part LXXIII. Die for Cutting Interior Scallops. C. W. Hinman. *Modern Industrial Press*, v. 9, Sept. 1947, p. 22.

Design details.

24-301. Design for Flash Welding. Harry W. Brown. *Aero Digest*, v. 55, Sept 1947, p. 82, 85-86, 89, 94.

The basic detail design considerations involved in the design of a typical flash welded assembly. The data are primarily applicable to tubular aircraft parts.

24-302. Die-Grams. Karl L. Bues. *Western Machinery and Steel World*, v. 38 Sept. 1947, p. 135-137.

Design of a punch-and-die assembly. (To be continued.)

24-303. Determination of Internal Stresses in Welded Joints by Means of X-Ray Investigation. S. T. Nazarov and Ia. E. Sanchuk. *Avtogennoe Delo (Welding)*, no. 5, 1947, p. 15-17. (In Russian.)

Application of X-rays with formulas for stress calculation

24-304. Distribution of Stress in the Longitudinal Seam of a Spot Welded Joint. D I Navrotskii *Avtogennoe Delo (Welding)*, no. 5, 1947, p. 18-19. (In Russian.)

Mathematical analysis of the stress distribution in the longitudinal seam of a spot welded joint. Formulas obtained permit determination of the resulting deformations.

24-305. Influence of Structural Elements on the Quality of Welded Products. N. A Sholotov. *Avtogennoe Delo (Welding)*, June 1947, p. 31-33. (In Russian.)

The principles of design of welded articles.

24-306. Rigid Frames—Reactions. C. Boldry. *Welder*, v. 16, April-June 1947, p 46-47.

An extension of the graphical static method used for pin-jointed braced frames where the reactions have to be found before the stress diagrams can be completed and the loads in all the members obtained.

24-307. Simple Method for the Detection of Residual Strains in Hardened Steel. D. M. Nakhimov. *Factory Laboratory (U.S.S.R.)*, v. 13, July 1947, p. 825-832 (In Russian.)

Effects of simultaneous exposure to mineral acids in gaseous and liquid form and application of tensile strain determined using split rings and wedges. The times required for crack formation and for complete failure are affected by the applied tension more than by the acid strength. 11 ref.

24-308. Photo-Elastic Stress Analysis. Roscoe Meadows and B. R. Lee. *Shipyard Bulletin*, v. 12, July-Aug. 1947, p 14-18.

Application in the laboratory of Newport News Shipbuilding and Dry Dock Co., Newport News, Va. Bakelite models are used.

24-309. Pattern of Square to Oblong Tee Intersecting Oblong Duct. O. W. Kothe *Sheet Metal Worker*, v. 38, Sept. 1947, p. 62-63.

Sheet-metal layout.

24-310. Research on Rail Sections. Walter Leaf. *Western Metals*, v. 5, Sept 1947, p 20-24.

Experiments in railroad metallurgy indicate need for new designs according to this report to A.S.M.E. fall meeting.

24-311. Casting Design; Effect of Simplification Upon Serviceability. W. T. Bean. *Metal Industry*, v. 71, Sept. 19, 1947, p. 239-243.

Essentially the same as "Sound Engine Design Thwarts Parts Fatigue" *SAE Journal*, v. 55, Sept. 1947, p. 44-45. (Item 24-288.)

24-312. Conversion to Welded Construction. Omer Blodgett. *Welding Engineer*, v. 32, Oct. 1947, p. 33-41.

Factors which must be considered, and recommended design for welded structures

24-313. Air and Hydraulic Cylinder Parts Constructed of Solid Steel Blocks. *Steel*, v. 121, Oct. 6. 1947. p. 129, 162, 165.

Simple design permits square-block construction instead of the usual circular design of cylinder head and cap, providing efficiencies of more than 98%. Other advantages.

24-314. Mobile Strain Gage Recording. *Engineer*, v. 184, Sept. 12, 1947, p. 244-245.

Equipment used by Vauxhall Motors for indicating and recording strain-gage indications as well as noise level, vibration, acceleration velocity, and displacement at various points on a moving road vehicle.

24-315. The Testing of Structural Connections. Arnold W. Hendry. *Engineering*, v. 164, Sept. 12, 1947, p. 261-263.

Details of tests on portal-frame knee joints, used in bridge construction. Several different welded joints were tested using strain gages and also by the photo-elastic method, using plastic models. The design shown to be superior was checked by destructive testing of 20 frames made under normal shop conditions. (Condensed from paper read before Section G of British Association, Dundee, Aug. 29, 1947.)

24-316. Shear Stresses in Springs. L. E. Adams. *Engineering*, v. 164, Sept. 19, 1947, p. 280.

A mathematical development. Table of values for convenient use.

24-317. Large Strains and Displacements in Stress-Strain Problems. K. H. Swainger. *Nature*, v. 160, Sept. 20, 1947, p. 399-400.

Mathematical development of a theory gives the relationship between stresses and values of displacement and strains in a loaded structure.

24-318. Plastic Deformation and Failure of Polycrystalline Metals Subjected to Strain. V. S. Averkiev, G. N. Kolesnikov, V. A. Pavlov, and M. V. Yakutovitch. *Engineers' Digest (American Edition)*, v. 4, Sept. 1947, p. 416.

Design of a machine for the strain testing of small test pieces in the shape of wires over a temperature range from 195 to 850° C. This machine makes it possible to determine the relationship between stress and strain—tensile stress and elongation at constant temperature and constant speed of straining. It is equipped for automatic registration of the stress-strain diagram. (Translated and abstracted from *Journal of Technical Physics (U.S.S.R.)*, v. 16, 1946, p. 1349-1356.)

24-319. The Influence of Production on the Design of Components in Light Engineering. W. Bauersachs and P. Gabler. *Engineers' Digest (American Edition)*, v. 4, Sept. 1947, p. 417-420.

The use of cost analyses in order to choose the most economical design and process, subject to the specifications of the component to be produced. Application to the processes of impact extrusion, die casting, welding instead of soldering, using interference fits, and brazing. (Translated and condensed from *Die Technik*, v. 1, Aug. 1946, p. 81-85.)

24-320. The All-Metal Wheelair Plane. K. S. Coward. *Modern Metals*, v. 3, Sept. 1947, p. 28-32.

Design of new plane known as the "Wheelair 111A", which differs radically in many respects from others on the market.

24-321. The Get-Together of Tool, Jig, and Fixture Design. J. T. Lancaster. *Tool Engineer*, v. 19, Oct. 1947, p. 37-42.

The economics of tooling, stressing importance of versatility for small lot production. A large number of examples.

24-322. Practical Applications of Involute Splines. *Tool Engineer*, v. 19, Oct. 1947, p. 47-48.

Discussed in general terms and in connection with tractor parts, giving a list of parts for which use of involute splines is now under consideration.

24-323. Progressive Design. *Die Castings*, v. 5, Oct. 1947, p. 21-22, 45.

Successive development of aircraft starter base from forged steel, to brazed assembly of steel stampings, to magnesium die castings. Comparison of machining schedules and other factors show advantages made possible by the change.

24-324. Scanning the Field for Ideas. *Machine Design*, v. 19, Oct. 1947, p. 79-81.

Torsion bars replace conventional springs on each pair of intake and exhaust valves in the engine; identification of molecules with microwave spectroscope; upright drawing boards to provide more space for draftsmen; stronger crankshafts and cost savings by molding method utilizing the cooling capacity of the continuous conveyer hangers on which the crankshafts are poured; and hopper feed which utilizes vibration for aligning blanks and introducing them into a centerless thread grinder.

24-325. Stress Distribution in Punch Presses Analyzed With Electric Strain Gages. *Machinery*, v. 54, Oct. 1947, p. 167-168.

Operation as applied to 30-ton press by Diamond Machine Tool Co., Los Angeles, and resulting design changes.

24-326. Ingenious Mechanisms. *Machinery*, v. 54, Oct. 1947, p. 183-186.

Oscillating motion transmitted from vertical to horizontal plane, by L. Kasper. Mechanism for controlling cutter-head slide of cam-generating device, by Charles and David Golosman.

24-327. A Tooling Program for Forged Globe Valves. Part X. (Concluded.)

Carl F. Benner. *Tool & Die Journal,* v. 13, Oct. 1947, p. 74-78.

Tool-design calculations for globe valves.

24-328. Design Improvements Achieved at no Added Cost. Ralph C. Osborn. *Electrical Manufacturing,* v. 40, Oct. 1947, p. 150-153, 240, 242, 244.

How complete redesign of vacuum-cleaner system, involving use of aluminum, plastics, and sheet steel, has resulted in a product that is lighter in weight, higher in efficiency and has improved appearance.

24-329. Master Cams Control Cutters. *Product Engineering,* v. 18, Oct. 1947, p. 98-99.

Milling machine mills all six pins and cheeks in a crankshaft in 48 min. working time. Constructional details.

24-330. Design Possibilities in the Silver Brazing of Cast Iron. Harold Frick. *Product Engineering,* v. 18, Oct. 1947, p. 128-132.

Surface-preparation procedures, recommended design principles, and costs for several examples.

24-331. Composite Dimensioning Speeds Production and Inspection. J. T. Bennett. *Product Engineering,* v. 18, Oct. 1947, p. 141-143.

Results in satisfactory interchangeable manufactured parts and facilitates inspection. Methods for defining dimensional limits of round holes, round corners, and angular tolerances.

24-332. Fatigue Strength of Steel Parts. Philip O. Johnson and Charles Lipson. *Product Engineering,* v. 18, Oct. 1947, p. 144-146.

Charts for the effect of stress concentration on fatigue strength.

24-333. Drawing Three-Dimensional Assemblies. W. E. Walters. *Machine Design,* v. 19, Oct. 1947, p. 82-87.

How three-dimensional drafting technique can be used in the production of three-dimensional assemblies and exploded views of machine units.

24-334. Overload Devices for Machine Protection. A. F. Gagne, Jr. *Machine Design,* v. 19, Oct 1947, p. 95-100, 134.

The need for means of automatically interrupting drive of a machine in case of abnormal operating conditions. Incorporating interrupting feature in machine and various types of devices.

24-335. Pneumatic Control Speeds Hydraulic Press Response. P. T. Delmer. *Machine Design,* v. 19, Oct. 1947, p. 107-108.

Construction and operation of the above Single-stroke, nonrepeat operation; continuous reciprocation by foot pedal; full automatic operation; precision inching control; reverse operation; flywheel.

24-336. Practical Design of Thin-Metal Stampings. Part I. Wallace C. Mills. *American Machinist,* v. 91, Oct. 9, 1947, p. 85-87.

Design engineer can save production men many headaches and tool troubles by use of practical thin-metal designs.

24-337. Industrial Design. Ken Unter. *American Machinist,* v. 91, Oct. 9, 1947, p 86-87.

Hints on design for safety, cleanliness, and appearance.

24-338. Bending Deformation of a Non-uniformly Heated Bar. M. I. Rozovskii. *Journal of Technical Physics (U.S.S.R.),* v. 17, June 1947, p. 657-660. (In Russian.)

A mathematical treatment of this deformation in a cylindrical bar of material which does not conform with Hooke's law.

24-339. Concerning a Process for Welded Construction of Blast Furnaces. V. L. Tsegel'skii, E. K. Alekseev and V. I. Mel'nik. *Avtogennoe Delo (Welding),* July 1947, p. 15-16. (In Russian.)

Design details and procedures.

24-340. A Moment Distribution Method for Rigid Frame Steel Structures Loaded Beyond the Yield. Point. M. R. Horne. *Transactions of the Institute of Welding (B.W.R.A. Supplement),* v. 10, Aug. 1947, p 6-15.

A method of computing the stresses due to flexure in a rigid steel frame. after the yield stress has been exceeded in a certain number of its members. Formulas for joint rotations, stiffness factors, carry-over factors, and joint translation factors for a beam of rectangular cross section at any stage of plastic deformation. Numerical evaluations of these formulas.

24-341. Notion d'une Portée Limite des Fils Pesants Flexibles. (Concept of Limits of Distortion for Heavy Flexible Wires.) P. Billaud. *Comptes Rendus,* v. 225, Aug. 25, 1947, p. 373-375.

The bending of heavy wires was studied on a theoretical and mathematical basis. An equation for equilibrium, diagram of the range, and the limits

24-342. Structural Problems of the Commercial Vehicle. V. W. Pilkington. *Institution of Automobile Engineers Journal,* v. 15 (*Proceedings,* v. 41), Aug-Sept. 1947, p. 335-365

An extensive discussion illustrated by examples of British manufacture

24-343. Face Buckling and Core Strength Requirements in Sandwich Construction. Conrad C. Wan. *Journal of the Aeronautical Sciences,* v. 14, Sept. 1947, p. 531-539.

Relations between wrinkling stress of facings of sandwich materials and physical properties of the core. Charts for estimating these stresses.

24-344. Determination of the Stress Concentration Factor of a Stepped Shaft Stressed in Torsion by Means of Precision Strain Gages. A. Weigand. *National Advisory Committee for Aeronautics Technical Memorandum No. 1179*, Sept. 1947, 12 p.

Stress concentration factor is ascertained from the measurements. It is shown that the test values always are slightly lower than the values resulting from an approximate formula by Sonntag. (Tanslated from *Luftfahrt-Forschung*, v. 20, July 20, 1943, p. 217-219.)

24-345. Compressive Strength of 24S-T Aluminum-Alloy Flat Panels With Longitudinal Formed Hat-Section Stiffeners Having a Ratio of Stiffener Thickness to Skin Thickness Equal to 1.00. William A Hickman and Norris F. Dow. *National Advisory Committee for Aeronautics Technical Note No. 1439*, Sept. 1947, 20 p.

Results for part of a test program.

24-346. Automatic Multilift Cam Mechanism. *Machinery (London)*, v. 71, Sept. 4, 1947, p. 263

Mechanism for imparting a variable movement to the slide of a wire-forming machine by a special cam.

24-347. Use of Strain Gages in the Testing of Motor Vehicles. *Machinery (London)*, v. 71, Sept. 25, 1947, p. 344-345.

Use by Vauxhall Motors, Ltd.

24-348. Die Castings for the Jack & Heintz Internal Combustion Engine. *Machinery (London)*, v. 71, Sept. 25 1947, p. 353-354.

Proposed design has been abandoned because of technical difficulties encountered in production of large and complex parts.

24-349. Liquid Springing. A. E. Bingham. *Engineering*, v. 164, Sept. 26, 1947, p 289-291.

Fundamental principles of "liquid springs"—shock-absorbing devices utilizing the compressibility of liquids at high pressures. The construction of high-pressure glands. the properties of different steels under these pressures (up to 50,000 psi.), and the properties of different liquids.

24-350. The Closed Gear Train. H. E. Merritt. *Engineer*, v. 184, Sept. 26, 1947, p 284-285.

Solutions are worked out for the design of gear trains in which each gear meshes with two other gears.

24-351. Aluminum + Plastics Offers Unusual Design Possibilities. Junius D. Edwards. *Iron Age*, v. 160, Oct. 23, 1947 p 46-48.

Recent developments in materials and processing techniques. Fabricating methods for combining aluminum and plastics.

24-352. Calculating the Cams for Automatic Lathes With Movable Headstock. André Daetwyler. *Microtecnic*, v. 1, Aug. 1947, p. 81-83. (English section.) (For figures see French section, p. 184-188.)

Details of process. (To be continued.)

24-353. Analytical and Experimental Investigation of Bolted Joints. Samuel J. Rosenfeld. *National Advisory Committee for Aeronautics Technical Note No. 1458*, Oct. 1947, 48 p.

A recurrence formula which in conjunction with the appropriate boundary equations can be used for calculation of bolt-load distribution for joints of uniform dimensions with bolts in line with the load. A procedure in which the recurrence formula is applied as a homogeneous finite-difference equation of the second order. In addition, an approximate analysis which may be used in most practical designs. An example demonstrates the use of the shear-lag solution and a comparison is made with other methods of analysis. The second part describes strain-gage tests for joints with five and nine bolts in line.

24-354. Effect of Variation in Diameter and Pitch of Rivets on Compressive Strength of Panels With Z-Section Stiffeners; Panels of Various Stiffener Spacings That Fail by Local Buckling. Norris F. Dow and William A. Hickman. *National Advisory Committee for Aeronautics Technical Note No. 1467*, Oct. 1947, 28 p.

24-355. Impact Tests on Two Truss Spans; Toledo Terminal Railroad. *American Railway Engineering Association Bulletin*, v. 49, Sept-Oct. 1947, p. 1-58.

A description and analysis of tests made on one 142-ft. deck span and one 250-ft. through draw span. The tests were made under steam locomotives and freight cars operating at speeds from 10 to 43 miles per hr. The stresses were measured by means of electromagnetic strain gages with oscillograph recording.

24-356. Designing of "Trouble-Free" Dies. Part LXXIV. Modern Engineering Trends in Presswork. C. W. Hinman. *Modern Industrial "Press"*, v. 9, Oct. 1947, p. 16, 44.

24-357. Convair's Celstrain Gages. *Modern Industrial "Press"*, v. 9, Oct. 1947, p. 40, 42.

The above are wafer-thin electrical units designed to facilitate the testing

of press-formed aircraft parts by providing accurate indications of localized surface strains due to compressive or tensional loads.

24-358. S.A.E. Involute Splines and Applied Involutometry. Part I. Merton W. Seavey. *Tool Engineer,* v. 19, Oct. 1947, p. 17-22.

Clarifies involute splines for the shop man as applicable to the 1946 S.A.E. Standard and to provide sufficient fundamental data to enable him to continue his study of splines, or to branch over into gearing. Interpretation of the formulas used to establish the values given in the tables. (To be concluded.)

24-359. Strain Gaging. *Iron and Steel,* v. 20, Oct. 1947, p. 492-493.

Application to investigation of behavior of materials in service.

24-360. Torsion Bars for Commercial Vehicles. N. E. Bateson. *SAE Quarterly Transactions,* v. 1, Oct. 1947, p. 549-556; discussion, p. 556-558.

Troubles experienced with conventional types of spring suspension in commercial vehicles could be eliminated by use of the torsion-bar type. (Presented at S.A.E. National Transportation Meeting, Chicago, April 17, 1947.)

24-361. Reducing Failures in Metal Parts. Arthur E. Focke. *Mining and Metallurgy,* v. 28, Oct. 1947, p. 495-497.

What a practicing metallurgist needs to know about design. He should be able to combine design knowledge with knowledge of metals in order to achieve the best practical solutions for problems.

24-362. Standard-Unit Tooling. *Aircraft Production,* v. 9, Oct. 1947, p. 378-380.

A practical system for jig and fixture assembly from stock parts.

24-363. Kinematics of Disk Cam and Flat Follower. Allan H. Candee. *Transactions of the A.S.M.E.,* v. 69, Oct. 1947, p. 709-718; discussion, p. 718-724.

The practicability of determining the proper shape of cam to produce a required motion by means of "geometrical kinematics". The general principles of geometry and kinematics can be applied, and the graphical method is not limited to determining a cam profile as the envelope of the follower.

24-364. Application of Tables for Helical Compression and Extension Spring Design. H. F. Ross. *Transactions of the A.S.M.E.,* v. 69, Oct. 1947, p. 725-734.

Tables developed for all standard steel-wire gages between 0.025 and 0.394 in., music-wire gages between 0.010 and 0.118 in., and most even fractional dimensions. Design considerations, and limitations, together with examples of the application of the tables.

24-365. A New Technique in the Construction of Major Assembly Jigs. Donald Paterson. *Sheet Metal Industries,* v. 24, Oct. 1947, p. 2035-2040, 2046.

Use of Cerromatrix, an easily fusible bismuth-rich alloy, for the setting of important location points. The properties and behavior on cooling of Cerromatrix, and procedures for its use.

24-366. Some Design and Structural Features of the Tucker. W. B. Griffin. *Modern Metals,* v. 3, Oct. 1947, p. 20-22.

Some of the design and structural features being incorporated into new car bodies for the first models, which may be stretch formed.

24-367. Brittle Lacquer Stress Analyzers. C. W. Smith. *Paint Manufacture,* v. 17, Oct. 1947, p. 333-338, 342.

Physical and chemical requirements which such coatings must fulfill, the basic formulations and optimum application conditions of suitable lacquers, types of test for which they are suitable, and results obtainable by their use.

24-368. Strain Gage Testing. *British Steelmaker,* v. 13, Oct. 1947, p. 528-530.

Research carried out by Vauxhall Motors, Ltd.

24-369. Instability Analysis and Design of an Efficiently Tapered Plate Under Compressive Loading. Samuel Pines and George Gerard. *Journal of the Aeronautical Sciences,* v. 14, Oct. 1947, p. 594-599; discussion, p. 599-600.

Design of a nonbuckling tapered plate acting under various compressive loadings is considered for both the elastic case and one in which a region is operating at stresses above the proportional limit.

24-370. Redesigning for Light Metals. William Graf. *Light Metal Age,* v. 5, Oct. 1947, p. 10-13, 20.

Redesign for aluminum of 5-ton crane with 50-ft. span.

24-371. Use of Oval Angle-Iron Holes Prevents Damage. *Sheet Metal Worker,* v. 38, Oct. 1947, p. 58.

Assembly of sheet-metal ductwork. Oval holes facilitate lining up of the holes in matching sections.

24-372. The Design of Spiral Springs. Victor Tatarinov. *Machinery (London),* v. 71, Oct. 2, 1947, p. 375-380.

Details of the mathematics involved, including two worked-out examples. Several graphs aid in the calculations.

24-373. Computer for Principal Stresses. R. G. Manley. *Engineering,* v. 164, Oct. 10, 1947, p. 340-341.

A slide-rule type computer and the principles of its operation, for evaluation of surface stresses from strain data obtained in different ways.

24-374. How to Design Form Milling Cutters. H. M. Huffman. *American Machinist,* v. 91, Oct. 23, 1947, p. 85-87.

Three steps involved—cutter diameter, tooth spacing, and helix angle.

24-375. Practical Design of Thin-Metal Stampings. Part II. Wallace C. Mills. *American Machinist,* v. 91, Oct. 23, 1947, p. 94-97.

Large number of sketches and accompanying explanations to show good and poor designs for various typical shapes.

24-376. Stress Analysis—Nondestructive. Harry M. Spring. *Industry and Power,* v. 53, Nov. 1947, p. 85-86, 112.

Uses of two types of stress indicators —the strain gage and brittle coatings —have progressed beyond just structural analysis and have been applied for regular and irregular shaped pressure vessels.

24-377. Sandwich Structures for Aircraft. What Research Promises. Robert McLarren. **What Practice Shows.** Irving Stone. *Aviation Week,* v. 47, Nov. 3, 1947, p. 28-29, 31-32.

Two reviews form joint article. 16 ref.

24-378. Small Zinc Alloy Die Castings—Economic and Design Advantages. Joseph Saks. *Product Engineering,* v. 18, Nov. 1947, p. 86-89.

Engineering design data. Tables compare relative advantages of various production methods.

24-379. Flame-Cut Disk Flywheels. *Product Engineering,* v. 18, Nov. 1947, p. 141-143.

Strength, kinetic energy, weight, and cost are compared with those of wheels with cast spokes.

24-380. Stamping Design and Fabrication for Porcelain Enameling. Carl F Benner. *Tool & Die Journal,* v. 13, Nov. 1947, p. 70-73.

Recommended procedures and designs.

24-381. Preignition Piston Failure Diagnosed in Single-Cyl Tests. Excerpt from "Piston Failure by Preignition and Detonation", by A. G. Cattaneo and E. P. Viscia. *SAE Journal,* v. 55, Nov. 1947, p 54-60.

Local peak piston temperatures govern whether and where piston failure takes place. This temperature is determined by general temperature level and temperature distribution on the piston and by the effects of local blowby and scuffing. Effects of other factors. (Presented at S.A.E. Northern California Section, San Francisco, Dec. 10, 1946.)

24-382. The Design of Stops for Press Tools. E. Barron. *Machinery (London),* v. 71, Oct. 16, 1947, p. 432-435.

24-383. Specifying for Economy in Springs. Part I. Ronald F. Pond. *Machine Design,* v. 19, Nov. 1947, p. 120-122.

Tells how to draw up specifications for springs which will do the job satisfactorily and yet not be more expensive than necessary.

24-384. Stability of Plates and Shells Beyond the Proportional Limit. A. A. Ilyushin. *National Advisory Committee for Aeronautics Technical Memorandum No. 1116,* Oct. 1947, 46 p.

A mathematical development. Results are applied to a typical problem. (Translated from *Applied Mathematics and Mechanics (U.S.S.R.),* N.S. 8, no. 5, 1944, p. 337-360.)

24-385. Strength Variations Under Alternating Stress With Phase Differences. G. V. Uzhik. *Bulletin of the Academy of Sciences of the U.S.S.R., Section of Technical Sciences,* June 1947, p. 709-716. (In Russian.)

A theoretical development of the changes in strength which occur in plane-stressed material under the influence of out-of-phase alternating stresses of the same frequency.

24-386. Drill Jig Accuracy Without Costly Construction. Robert Mawson. *Production Engineering & Management,* v. 20 Nov. 1947, p. 64.

How manufacturing cost of drill jigs can be lowered by confining accuracy to essential parts and eliminating unnecessary finish.

24-387. Stress-Strain and Elongation Graphs for Alclad Aluminum Alloy 75S-T Sheet. James A. Miller. *National Advisory Committee for Aeronautics Technical Note No. 1385,* Nov. 1947, 38 p.

Stress-strain, stress-deviation, tangent-modulus, and reduced-modulus graphs are plotted on a dimensionless basis to make them applicable to material with yield strengths which differ from those of the test specimens.

24-388. A Method of Calculating the Compressive Strength of X-Stiffened Panels That Develop Local Instability. George L. Gallaher and Rolla B. Boughan. *National Advisory Committee for Aeronautics Technical Note No. 1482,* Nov. 1947, 17 p.

Method can be used to calculate the critical compressive stress above, as well as within, the elastic range. For stresses above 15% of the compressive yield stress, the method can be used for approximate determination of average compressive stress at maximum load.

24-389. **Flange Design Calculations.** Harald E. Lonngren. *Petroleum Refiner,* v. 26, Nov. 1947, p. 130-134.

New formulas for determining flange thickness quickly with an assurance of obtaining a predetermined and uniform stress distribution in the flange.

24-390. **Internal Stresses in Metals and Alloys.** *Engineer,* v. 184, Oct. 24, 1947, p. 393-394.

Summarizes five papers and accompanying discussion presented on the subject of "Measurement of Internal Stresses" at Symposium held by the Institution of Mechanical Engineers, Oct. 15-16, 1947.

24-391. **Economy in Small Parts.** *Die Castings,* v. 5, Nov. 1947, p. 36-42.

Design changes in four small parts easily held in the palm of the hand which are claimed to result in over $100,000 savings in production. These are: center winding contact sector for self-winding clock; flash-gun component; and combination lock case and cover. Die castings play a large part in the new designs.

24-392. **S.A.E. Involute Splines and Applied Involutometry.** Merton W. Seavey. *Tool Engineer,* v. 19, Nov. 1947, p. 43-48.

Diagrams and symbols together with descriptions of the functions of spline and gear-tooth parts. The application of radians to S.A.E. formulas for splines; a glossary of works related to splines.

24-393. **Welding for Economy, Flexibility, Appearance. No. 3. Tractor Yarder.** H. A. Sanner. *Industry and Welding,* v. 20, Nov. 1947, p. 34-36, 38, 78-79.

Problems and solutions in redesigning a piece of heavy equipment which was formerly cast steel. Size, weight, complexity, and cost were materially reduced.

24-394. **Designing for Resistance Welding.** Ernie Lauter. *Industry and Welding,* v. 20, Nov. 1947, p. 55.

Begins series with a few elementary definitions and explanations. (To be continued.)

24-395. **Materials and Their Requirements for Automobile Stampings, Bumpers and Pistons.** Nelson G. Meagley. *Materials & Methods,* v. 26, Nov. 1947, p 74-78.

Examples of how automotive engineers use service requirements of parts as a means of selecting materials and methods of fabrication.

24-396. **Arc Welded Propeller Hub Weighs and Costs Less.** *Automotive Industries,* v. 97, Nov. 15, 1947, p. 42.

Design of propeller hub which effected a considerable savings in weight and cost over the previous forged structure. This design won first prize, from the James F. Lincoln Foundation's Design-for-Progress contest.

24-397. **The Tuned and Damped Gyrostatic Vibration Absorber.** R. N. Arnold. *Institution of Mechanical Engineers Proceedings,* v. 157, War Emergency Issue No. 25, 1947, p. 1-15; discussion, p. 16-19.

Experimental investigations with a gyrostatic absorber applied to a one-mass system under forced vibration. Design of a full-scale absorber built to suppress vibration of the table of a heavy planing machine.

24-398. **Torsional Stress Analysis of Twist-Drill Sections by Membrane Analogy.** E. T. P. Neubauer and O. W. Boston. *Transactions of the A.S.M.E.,* v. 69, Nov. 1947, p. 897-902.

Experiments to find the nature of the stress distribution in different drill cross sections due to applied torque. Procedure and results.

24-399. **Designing for Industry.** Henry Dreyfuss. *Western Machinery and Steel World,* v. 38, Nov. 1947, p. 78-81, 104.

Some functional design principles.

24-400. **Die-Grams.** Karl L. Bues. *Western Machinery and Steel World,* v 38, Nov. 1947, p. 102-104.

Design of a progressive pierce-and-blank die. (To be continued.)

24-401. **Recurrence Formulas and Differential Equations for Stress Analysis of Cambered Box Beams.** Joseph Kempner. *National Advisory Committee for Aeronautics Technical Note No. 1466,* Oct. 1947, 52 p.

24-402. **Pipe Columns for Crane Runway Support Increases Rigidity.** Charles G. Herbruck. *Welding Journal,* v. 26, Nov. 1947, p. 993.

Structural design.

24-403. **Fatigue Tests of Welding Elbows and Comparable Double-Mitre Bends.** A. R. C. Markl. *Transactions of the A.S.M.E.,* v. 69, Nov. 1947, p. 869-876; discussion, p. 877-879.

Investigation shows that welding elbows will withstand 2½ times as many stress reversals in bending in the plane, and 14 times as many cycles in bending transverse to the plane of curvature, as compared with mitre bends. Internal pressure, stress-relieving and grinding the welds produces no significant change in the endurance strength.

24-404. **Acme Thread Calculations.** J. S. Rojahn. *American Machinist,* v. 91, Dec. 4, 1947, p. 139.

Correlates information from several publications.

24-405. **Critical Compressive Stress for Outstanding Flanges.** Eugene E. Lundquist and Elbridge Z. Stowell. *Twenty-*

Eighth Annual Report of the National Advisory Committee for Aeronautics 1942 (Technical Report No. 734), 1946, p. 111-116.

A chart is presented for the values of the coefficient in the formula for the critical compressive stress at which buckling may be expected to occur in flat rectangular plates supported along the loaded edges, supported and elastically restrained along one unloaded edge, and free along the other unloaded edge. Mathematical derivations of the formulas required. 11 ref.

24-406. Restraint Provided a Flat Rectangular Plate by a Sturdy Stiffener Along an Edge of the Plate. Eugene E. Lundquist and Elbridge Z. Stowell. *Twenty-Eighth Annual Report of the National Advisory Committee for Aeronautics 1942 (Technical Report No. 735),* 1946, p. 111-116.

A sturdy stiffener is defined as a stiffener of such proportions that it does not suffer cross-sectional distortion when moments are applied to some part of the cross section. A formula is given for the restraint coefficient supplied to the plate by such a stiffener. This coefficient is required for calculation of critical compressive stress of the plate. 11 ref.

24-407. Shear Lag in Box Beams; Methods of Analysis and Experimental Investigations. Paul Kuhn and Patrick T. Chiarito. *Twenty-Eighth Annual Report of the National Advisory Committee for Aeronautics 1942 (Technical Report No. 739),* 1946, p. 171-208.

Methods of shear-lag analysis suitable for practical use. Strain-gage tests made by the N.A.C.A. to verify the theory. Numerical examples illustrating the methods of analysis.

24-408. Square Plate With Clamped Edges Under Normal Pressure Producing Large Deflections. Samuel Levy. *Twenty-Eighth Annual Report of the National Advisory Committee for Aeronautics 1942 (Technical Report No. 740),* 1946, p. 209-222.

A theoretical analysis. Values of bending stress and membrane stress at the center of plate and at the midpoint of the edge are given for center deflections up to 1.9 times the plate thickness. The shape of the deflected surface is given for low pressures and for the highest pressure considered. Results compare favorably with exact solutions for long rectangular and circular plates.

24-409. Normal-Pressure Tests of Rectangular Plates. Walter Ramberg, Albert E. McPherson, and Samuel Levy. *Twenty-Eighth Annual Report of the National Advisory Committee for Aeronautics 1942 (Technical Report No. 748),* 1946, p. 269-299.

Tests were made on 56 rectangular plates with clamped edges and five plates with freely supported edges. Center deflection and permanent set were measured. For some of the plates, strains and contours were also measured. Washboarding pressures were determined for three cases. Results are compared with those obtained by theoretical calculations. 13 ref.

24-410. The Future Development of Machine Tool Design. J. H. Wilkinson. *Machinery Lloyd (Overseas Edition),* v. 19, Nov. 8, 1947, p. 88-91.

Presented to Wolverhampton Section of Institution of Production Engineers.

24-411. Effect of Rib Proportions on Beam Bending Strength. A. R. Holowenko. *Product Engineering,* v. 18, Dec. 1947, p. 122-123.

How rib proportions influence bending strength. Curves are developed for proportions of ribbed-beam sections that have the same extreme fiber stress as the beam without a rib.

24-412. Strength and Clamping Force of Bolts. Kenneth H. Lenzen. *Product Engineering,* v. 18, Dec. 1947, p. 130-133.

Determination of forces in low-carbon steel, stress-relieved and tested under tension and torsion, and torqued by a nut. Derivation of a formula for the torque to be applied to a nut to obtain a desired clamping force. Accuracy of torque-predicted stresses.

24-413. "Bear-Up" Requirements for Aircraft. Bo Lundberg. *Aero Digest,* v 55, Dec. 1947, p. 56-58, 120-122.

Fundamental principles of fatigue strength requirements. (Condensed version of paper, presented at the Second I.C.A.O. Airworthiness Session, Montreal, March 1947.)

24-414. Salient Features of Handwheel Design. H. F. Williams. *Machine and Tool Blue Book,* v. 43, Dec. 1947, p. 178-184, 186, 188-191.

Factors influencing the design of handwheels, rim designs, and positive-grip handwheel rims for use on machine tools. (To be continued.)

24-415. Strain and Deformation Recording System. *Iron Age,* v. 160, Dec. 4, 1947, p. 74.

Direct recording of the deformation occurring in specimens subjected to tension, compression, or flexure by means of universal testing machines, through use of a strain recording system in which two miniature variable transformers are the essential actuating devices.

24-416. Specifying for Economy in Springs. Part II. Ronald F. Pond. *Machine Design,* v. 19, Dec. 1947, p. 115-120.

Compression, extension, torsion, and

other types of springs. Typical design problems illustrate recommended techniques.

24-417. New High-Speed Helical and Herringbone Gear Standard. *Machine Design,* v. 19, Dec. 1947, p. 157-158.

Although issued for use primarily in the design of self-contained speed-reducer units, the new American Gear Manufacturers Assoc. standard is said to be equally useful in the design of other types of high-speed helical gear drives.

24-418. Designing of "Trouble-Free" Dies. Part LXXVI. Modern Trends in Die Engineering. C. W. Hinman. *Modern Industrial "Press",* v. 9, Dec. 1947, p. 22, 42.

24-419. Economies Result When Parts Are Designed for Beryllium Copper. Robert W. Carson and Wayne Martin. *Materials & Methods,* v. 26, Dec. 1947, p. 79-84.

Proper design procedures for miscellaneous applications.

24-420. Buckling of Transverse Stiffened Plates Under Shear. Tsun Kuei Wang. *Journal of Applied Mechanics,* v. 14 (*Transactions A.S.M.E.,* v. 69), Dec. 1947, p. A269-A274.

An analysis of buckling of simply supported rectangular plates reinforced by any number of transverse stiffeners and subjected to shearing forces uniformly distributed along the edges. 14 ref. (Presented at Annual Meeting of A.S.M.E., Atlantic City.)

24-421. Stresses in a Notched Strip Under Tension. Chih-Bin Ling. *Journal of Applied Mechanics,* v. 14 (*Transactions A.S.M.E.,* v. 69), Dec. 1947, p. A275-A280.

A theoretical solution, the strip being notched by a pair of symmetrical semicircular arcs on its boundaries. Numerical examples of the solution are compared with experimental results. 16 ref. (Presented at Annual Meeting of A.S.M.E., Atlantic City, N. J.)

24-422. On the Use of Power Laws in Stress Analysis Beyond the Elastic Range. Alice Winzer and W. Prager. *Journal of Applied Mechanics,* v. 14 (*Transactions A.S.M.E.,* v. 69), Dec. 1947, p. A281-A284.

In a recent paper A. A. Ilyushin drew attention to the remarkable simplicity which the theory of plastic deformation assumes when the secant shear modulus is taken as a power of the octahedral shearing stress. Ilyushin's results are discussed in connection with a specific example; great caution is necessary in the use of such power laws. (Presented at Annual Meeting of A.S.M.E., Atlantic City.)

24-423. Note on the Tightness of Expanded Tube Joints. G. Sachs. *Journal of Applied Mechanics,* v. 14 (*Transactions A.S.M.E.,* v. 69), Dec. 1947, p. A285-A286.

A simple theoretical evaluation of conditions conducive to maximum tightness. Residual pressure between tube and plate, which can be considered as a measure of the tightness, possesses a maximum at certain tube dimensions. (Presented at Annual Meeting of A.S.M.E., Atlantic City.)

24-424. Torsion of a Rectangular Tube. J. M. Klitchieff. *Journal of Applied Mechanics,* v. 14 (*Transactions A.S.M.E.,* v. 69), Dec. 1947, p. A287-A288.

A theoretical, mathematical development. (Presented at Annual Meeting of A.S.M.E., Atlantic City, N. J.)

24-425. Deflections and Moments of a Rectangular Plate Clamped on All Edges and Under Hydrostatic Pressure. Ezra G. Odley. *Journal of Applied Mechanics,* v. 14 (*Transactions A.S.M.E.,* v. 69), Dec. 1947, p. A289-A299

Two solutions. The first is based on the usual procedures and the second is the method developed by H. Marcus in Germany in 1936. (Presented at Annual Meeting of A.S.M.E.)

24-426. Approximate Solutions for Symmetrically Loaded Thick-Walled Cylinders. C. W. MacGregor and L. F. Coffin, Jr. *Journal of Applied Mechanics,* v. 14, (*Transactions A.S.M.E.,* v. 69), Dec. 1947, p. A301-A311.

Based upon an extension of the theory of a bar on an elastic foundation, a solution is given in closed form. The analysis avoids the tedious computation of stresses inherent in exact solutions by Fourier series or Fourier-integral methods and is in a form which can easily be used by designers. (Presented at Annual Meeting of A.S.M.E., Atlantic City, N. J., Dec. 1-5.)

24-427. A Numerical Solution for the Torsion of Hollow Sections. E. C. Colin, Jr., and N. M. Newmark. *Journal of Applied Mechanics,* v. 14, (*Transactions A.S.M.E.,* v. 69), Dec. 1947, p. A313-A315.

Method involves use of finite differences and can be used with either the iteration procedure due to Liebmann, or the relaxation procedure attributed to Southwell. The method avoids the necessity of combining a number of separate solutions. (Presented at Annual Meeting of A.S.M.E.)

24-428. Welded Beam Design Reduces Production Costs of Continuous Weighing Machines. *Steel,* v. 121, Dec. 15, 1947, p. 108.

24-429. Methods for Investigation of the Effects of Machining and Rounding-Off on Changes in Residual Stresses in Tub-

ing. L. A. Glickman. *Factory Laboratory (U.S.S.R.)*, v. 13, Aug. 1947, p. 983-989. (In Russian.)

Results of an extensive experimental and theoretical investigation. Possibility of using G. Sachs' equations is indicated. In most cases a graphical-analytical method is necessary, but for certain cases the calculation may be made without use of graphs.

24-430. What Price Lightness? *Magnesium*, Nov. 1947, p. 2-3.

Tables to assist in design calculations to indicate whether the lightness of magnesium is worth the cost differential for specific uses.

24-431. Some Investigations of the General Instability of Stiffened Metal Cylinders Subject to General Instability Failures. Louis G. Dunn. *National Advisory Committee for Aeronautics Technical Note No. 1198*, Nov. 1947, 49 p.

24-432. Diagonal Tension in Curved Webs. Paul Kuhn and George E. Griffith. *National Advisory Committee for Aeronautics Technical Note No. 1481*, Nov. 1947, 29 p.

The engineering theory of incomplete diagonal tension in plane webs presented in N.A.C.A. TN No. 1364 is generalized in order to make it applicable to curved webs. Comparisons between calculated and experimental results for a number of stiffened cylinders subjected to torsional loads.

24-433. The Design of Simplified Structures for Low-Cost Aeroplanes. A. Z. Boyajian. *Aircraft Engineering*, v. 19, Nov. 1947, p. 347-352.

The customary theories of stress analysis used in transferring normal shear loads in a chordwise direction to the bending resistant spars of a stressed skin wing are believed to be somewhat erroneous and misleading. New theories are suggested. (Presented at Annual Meeting of the Institute of the Aeronautical Sciences, Jan. 1946.)

24-434. A Direct Reading Electrical Strain Meter. F. C. Widdis. *Journal of Scientific Instruments*, v. 24, Nov. 1947, p. 302-303.

A meter constructed from a portable galvanometer. It can be used with all types of commercially available electrical resistance strain gages without modification. Sources of error.

24-435. Pullman-Standard Develops General-Service Box Car. *Railway Mechanical Engineer*, v. 121, Dec. 1947, p. 679-682.

Design details and construction methods, including structural welding.

24-436. A Hot Wound Spring Is Another Thing. *Mainspring*, v. 12, Dec. 1947, p. 2-5.

Fundamental principles in the design and selection of materials for hot wound, steel coil springs, which are the big ones too heavy to coil cold.

24-437. Electronic Methods for the Measurement of Strain in Metals. H. F. Hamburg. *Electronic Methods of Inspection of Metals (American Society for Metals)*, 1947, p. 1-15.

Describes principles and construction of the resistance-wire strain gage; and outlines construction of various electronic equipment for static testing, for dynamic testing, and for fatigue testing.

24-438. Effect of Surface Stressing Metals on Endurance Under Repeated Loadings. H. F. Moore. *Surface Stressing of Metals (American Society for Metals)*, 1947, p. 1-18.

Various types of stresses, what causes them, their effect on the metal. Fatigue resulting from stresses.

24-439. Measurement of Surface Stresses. W. M. Murray. *Surface Stressing of Metals (American Society for Metals)*, 1947, p. 19-32.

Wire resistance strain gages, Stresscoat method, and photoelasticity as ways of measuring surface stresses. Field applications of the methods.

24-440. Fatigue of Metals as Influenced by Design and Internal Stresses. J. O. Almen. *Surface Stressing of Metals (American Society for Metals)*, 1947, p. 33-84.

90% of failures are traceable to faults in design or production rather than in the metal itself. Mechanical causes of failure and surfaces that are vulnerable to fatigue. Effects of peening in improving endurance of machine parts. Types of failures that occur in machine parts. Data which may be obtained from fatigue tests. Endurance of parts under heavy loads.

24-441. Stressing Axles and Other Railroad Equipment by Cold Rolling. O. J. Horger. *Surface Stressing of Metals (American Society for Metals)*, 1947, p. 85-142.

Surface rolling of axles and surface pressing of other parts have been long steps toward reducing fatigue failures. These surface preparation methods are described in detail and testing methods explained. Parts besides axles dealt with are piston rods, connecting rods, springs, wheels. 63 ref.

24-442. Progressive Stress-Damage. Peter R. Kosting. *Surface Stressing of Metals (American Society for Metals)*, 1947, p. 143-189.

Types of cracks appearing in guns after repeated firing. Tests devised to determine to what extent mechanical stress was responsible for the cracks. 35 ref.

24-443. Precision Determination of Stress-Strain Curves in the Plastic Range. John R. Low, Jr., and Frank Garofalo. *Proceedings of the Society for Experimental Stress Analysis,* v. 4, no. 2, 1947, p. 16-24.

A method for the determination of simple-tension stress-strain curves in the plastic range with high precision by means of a ring dynamometer to measure loads and a straight-beam "clip gage" to measure strain; in both instruments SR-4 strain gages were used indirectly to indicate load and strain values. An analytical expression relating true stress and true strain in the plastic range in simple tension. Constants for a number of different materials along with typical logarithmic stress-strain curves.

24-444. Stress Analysis Utilization in Dynamic Testing. Roy W. Brown. *Proceedings of the Society for Experimental Stress Analysis,* v. 4, no. 2, 1947, p. 42-51.

Simplified and coordinated stress-analysis and dynamic tests of experimental structures indicate reduced development time and cost. New instruments make possible further improvement in experimental analysis. The development of a new aircraft undercarriage is used as an example necessitating analysis of both metal and rubber compounds. Systematic collection of service data by the user is strongly urged.

24-445. Device for Maintaining Continuous Electrical Connections With Reciprocating Engine Parts. W. A. Wallace and W. A. Casler. *Proceedings of the Society for Experimental Stress Analysis,* v. 4, no. 2, 1947, p. 52-61.

Apparatus has proven its usefulness and serviceability in determination of temperature, stress, and mechanical action of reciprocating-engine parts under actual operating conditions.

24-446. Evaluation of Various Methods of Rotor-Blade Analysis by Means of a Structural Model. Robert Mayne. *Proceedings of the Society for Experimental Stress Analysis,* v. 4, no. 2, 1947, p. 62-73.

Preliminary results of stress anlysis of rotor blades concern solely static loads, such as occur in hovering. The main objective was to determine which of several methods of propeller analysis is best suited to rotor blades. Another objective is to check some of the assumptions currently made in rotor-blade analysis.

24-447. Reluctance Gages for Telemetering Strain Data. W. H. Pickering. *Proceedings of the Society for Experimental Stress Analysis,* v. 4, no. 2, 1947, p. 74-77.

The relative merits of a number of reactance gages, with particular emphasis on the variable-inductance type of gage which consists of a coil of wire wound on a core of magnetic material with a variable air gap.

24-448. Endurance—A Criterion of Design. W. T. Bean, Jr. *Symposium on Testing of Parts and Assemblies (American Society for Testing Materials),* 1947, p. 25-38; discussion, p. 39-40.

The practical manner in which an engine builder may use Stresscoat and strain-gage techniques to analyze fatigue failure, since endurance strength is automatically achieved when the fatigue problem is solved.

24-449. Stress Concentration and the Fatigue Strength of Engine Components. Charles Gadd, N. A. Ochiltree, and Andrew Zmuda. *Symposium on Testing of Parts and Assemblies (American Society for Testing Materials),* 1947, p. 76-81; discussion, p. 82-86.

The authors have attempted to compile data for checking the theoretical strength of parts of complicated shape against their actual fatigue strength. In each case, the analysis has been by measurements of maximum local stress at points of stress concentration, rather than by calculation, using either $\frac{1}{16}$ or $\frac{1}{8}$-in. extensometers, while the actual fatigue strength has been obtained by testing a sufficient number of specimens to permit construction of a complete S-N diagram.

24-450. Compressive Stress-Strain Properties of Some Aircraft Materials. P. E. Sandorff and R. K. Dillon. *American Society for Testing Materials Proceedings,* v. 46, 1946, p. 1039-1052.

Results of a comprehensive investigation of compression stress-strain data and tangent-modulus versus stress data for the commonly used aircraft materials. The test fixtures and extensometer equipment and methods of analyzing and presenting the data. Curves which show the stress-strain characteristics for materials as tested as well as for those with specified minimum strength properties. 17 ref. (Presented at 49th Annual A.S.T.M. Meeting, Buffalo, N. Y., June 24-28, 1946.)

24-451. The Technological Principles of Casting Design. Victor M. Shestopal. *Proceedings of the Institute of British Foundrymen,* v. 39, 1945-1946, p. B51-B63; discussion, p. B63-B65.

Previously annotated in R.M.L., v. 3, 1946.

24-452. Pattern and Allied Equipment; Design, Redesign and Interchangeability. William E. Tharp. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 369-376.

Previously annotated in R.M.L., v. 3, 1946.

SECTION XXV

MISCELLANEOUS

25-1. Mechanical Materials Handling Increases Output of Small Motors. *Production Engineering & Management,* v. 18, Dec. 1946, p. 66-74.

Incoming raw stock unloaded from cars, weighed and piled by one operator; parts in process moved from station to station without manual assistance; machine operations served by mechanical loading and unloading devices; assembly processes expedited by fixtures which eliminate monotonous tasks; final inspection speeded up by conveyerized hot-run testing equipment; product packaging accomplished by mechanical man-hour reducing devices.

25-2. Manufacturing Research Spearheads Drive for Lower Production Costs. *Production Engineering & Management,* v. 18, Dec. 1946, p. 87-88, 112.

Manufacturing research setup now being established by International Harvester in Chicago will serve as a center for specialized, intensive study of improved manufacturing processes and will supplement other plant research.

25-3. Present Trends in Alloys. *Petroleum Engineer,* v. 18, Dec. 1946, p. 79-80.

Development and research staff of International Nickel Co. discuss alloy steels; stainless steels; high-temperature alloys; alloy cast irons; cast bronzes; high-nickel irons; nickel plating; nickel and high-nickel alloys.

25-4. Work of the B.C. Research Council in Mining and Metallurgy. *Western Miner,* v. 19, Dec. 1946, p. 68.

Investigations in physical metallurgy and heat treatment; foundry practice; stress analysis and design; reduction metallurgy; ore dressing; ceramics; industrial mineral beneficiation.

25-5. Packaging. Part IV. Methods of Applying Water-Vapor Barriers, and the Water-Vapor Resistance of Some Packaging Materials. C. G. Lavers and Jesse A. Pearce. *Canadian Journal of Research,* v. 24, Sec. F, Nov. 1946, p. 409-419.

Water-vapor resistance and ability to withstand rough handling were investigated for a wide variety of packaging materials at room temperature and at $-40°$ F. Laminated materials having metal foil as one layer provided the greatest protection. 11 ref.

25-6. Fisher Body Devises Aids for Pressed-Metal Handling. Part II. Rupert Le Grand. *American Machinist,* v. 91, Jan. 2, 1947, p. 86-87.

Results obtained when standardized shop trucks, skid boxes and dollies are used in subassembly operations.

25-7. Wrought Aluminum Alloy Nomenclature. O. L. Mitchell. *Aluminum and Magnesium,* v. 3, Dec. 1946, p. 13, 15, 30, 32.

Current nomenclature system for the various wrought aluminum alloys. Material is placed in chronological order so that it can be used as a handy reference.

25-8. Ordnance Department Research and Development. Al Leggin. *Chemical and Engineering News,* v. 24, Dec. 25, 1946, p. 3350-3351.

Fifth in a series on the War Department research and development program. Organization of this work and the problems being investigated.

25-9. Metallic Titanium and Its Alloys. R. S. Dean and B. Silkes. *Bureau of Mines Information Circular* 7381, Nov. 1946, 38 p.

Occurrence, methods of preparation, powder metallurgy, fabrication, properties, uses, and alloys of titanium. 256 ref.

25-10. 1947 Annual Forum on Technical Progress in Metalworking. *Steel,* v. 120, Jan. 6, 1947, p. 211-218, 220, 222, 224, 226, 231, 232, 234, 236, 239, 240, 242, 244, 251, 254, 257-260, 262, 265, 268, 270, 272, 275-278, 280-282, 285-286, 289-292, 294, 296-298, 300-302, 304, 311, 384-386.

Comments by leading authorities on recent and prospective developments relating to the production of metals and their fabrication into finished

products. Sections cover metallurgy; casting; forging and forming; joining and welding; metal production; machining; equipment; heat treating; surface treatment; inspection and testing; lubrication; materials handling.

25-11. Modernized Methods at Nash Increase Production Efficiency. *Production Engineering & Management,* v. 19, Jan. 1947, p. 66-75.

How parts are fabricated and assembled and flow in a continuous and uninterrupted stream to the basic assembly line.

25-12. 34th Annual Review of Metalworking Equipment Parts and Materials. *American Machinist,* v. 91, Jan. 16, 1947, p 117-212.

Concise, classified review of more than a thousand new products of interest to the metalworking industries.

25-13. Some Aspects in the Development of Alloy Steels. L. Rotherham. *Metallurgia,* v. 35, Dec. 1946, p. 75-77.

Directions in which alloy steels have been developed during and since the war, including alloy conservation, heat treatment improvements, welding, machinability, newer high temperature alloys, new casting methods.

25-14. Copper and Copper Alloys. E. Voce. *Metallurgia,* v. 35, Dec. 1946, p. 78-84.

Technical progress during 1946. Production of copper and its up-grading by distillation; the casting and properties of a number of copper alloys; corrosion and oxidation and some aspects of physical metallurgy. 50 ref.

25-15. Magnesium and Its Alloys. F. A. Fox. *Metallurgia,* v. 35, Dec. 1946, p. 85-91.

Recent technical progress in extraction and production, fabricating processes, engineering processes, protection, research on alloys, structure, corrosion, design and applications. 52 ref.

25-16. Lead and Its Alloys. Brian M. Reavell. *Chemical Age,* v. 56, Jan. 4, 1947, p. 21-25.

History, mining, refining, problems of purification, commonly used alloys, chemical properties, applications, methods of casting.

25-17. Canadian Research on Magnesium Alloys. J. W. Meier. *Modern Metals,* v. 2, Jan. 1947, p. 20-24.

The facilities available for research on magnesium and some of the work already completed or under way.

25-18. Annual Engineering Review. *Materials & Methods,* v. 25, Jan. 1947, p. 87-110.

Developments in selection of engineering materials and methods of processing them. Carbon and low-alloy engineering steels; stainless steels, tool-steels, heat resistant alloys; cast irons and steels; aluminum and magnesium alloys; copper and its alloys; other nonferrous metals; parts and metal-forms; plastics; woods, rubbers, glass, other nonmetallics; melting and casting; rolling, wiredrawing, extruding; powder metallurgy; forging; stamping, drawing and pressworking; machining; welding, joining, fastening, cutting; heating and heat treating; cleaning and pickling; finishing and coating; coatings; testing and inspection; instrumentation and control.

25-19. Steel. *Russian Technical Research News,* v. 1, no. 5, 1947, p. 4.

Outlines four recent papers: Analysis of forces involved in cold rolling. Use of centrifuge to corroborate results of X-ray analysis of eutectic alloys. Atomic structure of scale on steel. Hairline cracks in steel.

25-20. Plant Freezer. *Steel,* v. 120, Feb. 10, 1947, p. 98-99, 108.

With dry ice roller bearings can be shrunk onto huge eccentric shafts easily and in short time. Procedure.

25-21. Turntables Aid Assembly-Line Testing. Ben C. Brosheer. *American Machinist,* v. 91, Feb. 13, 1947, p. 129-132.

How Hotpoint dishwashers are quickly moved by conveyer turntables to test stands, avoiding inspection tie-ups on final assembly line.

25-22. Aluminum and Magnesium. John D. Sullivan. *Mining and Metallurgy,* v. 28, Feb. 1947, p. 63-64.

1946 developments in recovery and fabrication.

25-23. Ferrous Physical Metallurgy. R. F. Miller. *Mining and Metallurgy,* v. 28, Feb. 1947, p. 74-77.

Surveys new information published in 1946, which includes much material previously withheld because of war-time security regulations.

25-24. Recent Developments in the Physical Metallurgy of Copper and Copper Alloys and in Equipment and Practice. H. L. Burghoff and W. D. France. *Mining and Metallurgy,* v. 28, Feb. 1947, p. 79-84.

In casting shop trend has been to faster, larger melting furnaces of low-frequency induction type, water-cooled molds and continuous casting. Progress in hot and cold rolling. Research work of Pell-Walpole and other significant studies and researches of 1946.

25-25. Ferro-Alloying Materials. R. M. Briney. *Mining and Metallurgy,* v. 28, Feb. 1947, p. 90.

New type ferro-alloy furnace. Economic position of tungsten, molybdenum, vanadium, boron, manganese and other alloying materials.

25-26. Control of Vibration Can Increase Production Efficiency. John Parina, Jr. *Steel,* v. 120, Feb. 17, 1947, p. 94-96, 98, 118, 121-122, 124.

Various available materials for vibration control and standard methods of their application.

25-27. Efficient Handling Lowers Welding Costs. *Industry and Welding,* v. 20, Feb. 1947, p. 26-29, 58.

Assembly line methods at Reliance Electric Co.

25-28. The Platinum Metals Industry in Germany. E. C. Rhodes, C. H. Jahn and A. G. Dowson. *British Intelligence Objectives Sub-Committee,* 1945, 53 p.

Significant additions to both fundamental knowledge and processing techniques. Includes high-frequency vacuum melting and casting; production of mirror surfaces by evaporation of metal films onto glass; studies on platinum-gold alloys; beryllium-platinum alloys; quantitative spectrographic analysis of binary platinum alloys; production of refractory crucibles and tubes; and miscellaneous refining, analytical, and production techniques. Appendices contain more complete details on certain processes as provided by German personnel. Some of these are in German.

25-29. 10,000 Trade Names. T. W. Lippert. *Iron Age,* v. 159, Jan. 2, 1947, p. 172-175, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286-286L, 288, 290; Jan. 9, 1947, p. 65-68, 139-142, 145-149; Jan. 16, 1947, p. 64-66, 140, 142-143; Jan. 23, 1947, p. 63-68, 131-134; Jan. 30, 1947, p. 62-66, 149; Feb. 6, 1947, p. 69-72, 154-168; Feb. 13, 1947, p. 66, 136, 138, 140, 142-144, 146, 148, 150, 152-162.

Materials used in the metals and metal-working industries listed in alphabetical form. Tells what the trade name covers, its composition if it is a material, how or where it is used, and full address of the manufacturer or supplier. (To be continued. Reprint of the complete series to be published. Future installments will not be abstracted.)

25-30. Survey of Metallurgical Research in Japan During the War. S. A. Herres. *Metal Progress,* v. 51, Feb. 1947, p. 273-290.

Abridgment of complete report gives a good view of the scientific and technical condition in this enemy country during the years 1940-1945.

25-31. Production Applications of Electronics. *Machinery (London),* v. 70, Jan. 16, 1947, p. 76-78.

Speed and torque regulation of motors; high-frequency induction heating; electronic control for resistance welding.

25-32. Metallurgical Progress and the Rubber Industry. *India-Rubber Journal,* v. 112, Feb. 1, 1947, p. 155-156, 159.

Recent developments in production of stainless clad steels; nitrocellulose proofing of textiles; new field for acrylonitrile; rubber torsion springs; dyeing thermoplastics; Plastazote in aircraft construction; silicone as mold lubricant; bonding with thermosetting plastic; a new filter medium made of stainless steel powder.

25-33. Handling and Processing Chips and Scrap. John E. Hyler. *Machine and Tool Blue Book,* v. 43, Feb. 1947, p. 202-204, 206-208, 210, 212-214, 216, 218, 220, 222, 224, 226.

Various methods used to remove chips and scraps from machines. Lift trucks, conveyers, magnets and other loading equipment are mentioned. Necessity of completely removing all oil from chips is strongly stressed. Briquetting is briefly touched upon.

25-34. Review of Iron and Steel Literature for 1946. E. H. McClelland. *Blast Furnace and Steel Plant,* v. 35, Feb. 1947, p. 227-229.

Thirtieth annual review of iron and steel literature. Books and pamphlets published during 1946, with a few of earlier date not included in the previous review.

25-35. War Effects on the German Steel Industry. Julius E. Graf. *Iron and Steel Engineer,* v. 24, Feb. 1947, p. 53-57; discussion, p. 57-58.

Steelmaking capacity; plants geared to use ores imported from Sweden; description of Herman Goering works near Salzgitter; welding technique; tubing production; estimate of postwar potentialities.

25-36. Discussion on Steelworks Locomotives—Diesel Versus Steam. *Journal of the Iron and Steel Institute,* v. 155, Jan. 1947, p. 88-106.

Discussion at meeting of the Iron and Steel Engineers Group of the Iron and Steel Institute, London, Oct. 16, 1946. Advantages and disadvantages of both types for steelworks transportation problems.

25-37. First Annual Report July 1st, 1945 to June 30th, 1946. *The Council of The Motor Industry Research Association, Brentford, Middlesex, England,* Dec. 1946, 61 p.

The various research programs of the association include: filtration of used lubricating oils, performance of bearings and bearing materials, fatigue strength of crankshafts, durability of gears, deep-drawing properties of sheet metals, engine performance with leaded fuels, electrical strain gages, piston ring design, stiffness in frames, stresses in frames, fuel injection, and cylinder-head design.

25-38. Germanium and Its Compounds. A. G. Arend. *Industrial Chemist,* v. 23, Feb. 1947, p. 77-82.

Sources, production methods, properties and applications.

25-39. Copper in 1946. James Douglas. *Mining Congress Journal,* v. 33, Feb. 1947, p. 63-66.

1946 developments and 1947 prospects.

25-40. Do You Have a Coil Handling Problem? *Flow,* v. 2, March 1947, p. 20-22

Materials handling system for movement of hot rolled coiled rods for mass production in wiredrawing operations at National Screw & Mfg. Co., Cleveland

25-41. Aluminum Developments. S. A. J. Sage. *Metallurgia,* v. 35, Feb. 1947, p. 193-196.

Some of the metallurgical advances made in the aluminum industry during the war including increased rate of extraction of alumina from bauxite, greatly increased production of super-purity aluminum for the production of high-strength alloys, cladding of extrusions, continuous and semicontinuous billet casting, casting alloys, mechanized foundries, surface finishes, and inspection.

25-42. The Everchanging Picture in Materials and Processing Equipment. *Steel Processing,* v. 33, Feb. 1947, p. 98-100.

Adherence to traditional materials, methods and equipment keeps quality low and costs up in many instances. Expansion in the knowledge of and use of toolsteels, stainless steels, clad steels.

25-43. Aluminum Therapy and Silicosis Prevention. Part I. Medical Aspects. W. D. Robson. *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 50, Feb. 1947, p. 57-67. (Bound with *Canadian Mining and Metallurgical Bulletin.*)

Experimentation, recommended preventive uses of aluminum dust and recommended therapeutic treatments.

25-44. Aluminum Therapy and Silicosis Prevention. Part II. Engineering Aspects. A. W. Jacob. *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 50, Feb. 1947, p. 68-83. (Bound with *Canadian Mining and Metallurgical Bulletin.*)

Type of powder used, supervision of the treatment, the filter-paper sampler, and methods used to treat individuals already affected with silicosis, using more concentrated doses.

25-45. Developments in Aircraft Materials and Processes. Paul E. Lamoureux. *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 50, Feb. 1947, p. 104-126. (Bound with *Canadian Mining and Metallurgical Bulletin.*)

Aluminum alloys; steel; superalloys for gas turbines; wood; plastics; adhesives; fuels; lubricants; synthetic rubber; shot-peening; protection against corrosion; X-ray inspection; heat treatment; cold treatment; electroplating.

25-46. Wartime Advances in Nonferrous Metallurgy in Britain. Basil J. S. Bard. *Metal Progress,* v. 51, March 1947, p. 411-413, 460.

The development of new alloys, improved processes, and drastic reduction of the time lapse between research discovery and practical application.

25-47. Automatic Handling Aids Plating Success. M. E. Kilroy. *American Machinist,* v. 91, March 27, 1947, p. 84-87.

An account of equipment and procedures at Daystrom Corp. where automatic handling has stepped up production 100% with no labor increase, only 35% more space, and few rejections.

25-48. Disposal of Cyanide Wastes. (Concluded.) John G. Dobson. *Metal Finishing,* v. 45, March 1947, p. 68-71.

The alkaline chlorination method for neutralization of these wastes. Methods for determining freedom of waste from cyanide. The design of plants for the neutralization and disposal process.

25-49. Progress in Engineering Knowledge During 1946. P. L. Alger, James Stokeley, J. L. Tugman, F. H. Faust, W. W. Kuyper, E. L. Robinson and W. D. Haylon. *General Electric Review,* v. 50, March 1947, p. 12-55.

Excellent survey by seven experts is extensively illustrated. Main sections on materials, design, and applications, each being subdivided into appropriate subtopics. An extensive classified bibliography.

25-50. Technical Highlights of the Western Metal Congress. *Steel,* v. 120, March 31, 1947, p. 86-87, 96, 99-100.

Wide range of subjects on steelmaking, casting, joining, heat treating, surface finishing, inspection and testing of ferrous and nonferrous materials discussed at meetings sponsored by American Society for Metals at Oakland, Calif.

25-51. Mechanical Handling in the Foundry. W. Morison Philip. *Foundry Trade Journal,* v. 81, March 6, 1947, p. 179-181; discussion, p. 181-182.

Touches on the different departments in foundries where mechanical handling has been devised, starting with the unloading of coke, pig, scrap, limestone, sand, placing this in convenient dumps, reclaiming, weighing and feeding to cupolas.

25-52. Fork Trucks Feed Heavy Stocks to Automatics. *Iron Age,* v. 159, April 3, 1947, p. 68.

Feeding heavy bar stock to Cone automatics directly from the electric fork

lift truck used to move the stock from the storage location to the machine is a means of cutting costs through more effective utilization of industrial electrical trucks.

25-53. Handling Materials for Steelmaking. Charles M. Parker. *Iron and Steel Engineer*, v. 24, March 1947, p. 79-80.

The great amount of handling existing in the steel industry. A load of ore is followed from pit to finished product with emphasis on the number of handlings.

25-54. Electric Counterweights for Ingot Stripping Cranes. R. J. Harry. *Iron and Steel Engineer*, v. 24, March 1947, p. 105-107.

An ingenious modification of the usual circuit controlling of a stripper crane causes the hoist motor to act as an electric counterweight.

25-55. Quality Tool Steels. H. C. Bigge. *Western Machinery and Steel World*, v. 38, March 1947, p. 74-77, 92-93.

The history of the development of these steels, and techniques now used in their conversion from raw material to finished product.

25-56. Surface and Overhead Conveyers Help Speed Kitchen Stoves to Waiting Market. *Steel*, v. 120, April 7, 1947, p. 92-93.

Kalamazoo Stove & Furnace Co., Kalamazoo, Mich., spent $2,500,000 in redesigning the plant for new tools and dies, and for creating new range and furnace designs.

25-57. Smoke and Dust Control, Heating and Ventilating in the Sorel Plant. Part II. *Industrial Heating*, v. 14, March 1947, p. 422-424, 426, 428, 430, 432.

Control of foundry and forge smoke, and the ventilation of the heating furnace area.

25-58. Metallurgical Progress and the Plastics Industry. L. Sanderson. *British Plastics*, v. 19, Feb. 1947, p. 85-87.

Recent developments in welding; wet-belt machining; salvage sorting of aluminum bronze from manganese bronze; low-melting alloys; heat resistant and high temperature alloys; all-steel electric motors; cutting coolants; porcelain coatings for steel; aluminum plastic laminates; and other miscellaneous developments.

25-59. Man-Hour Output Raised by Mechanized Parts Handling. *Production Engineering & Management*, v. 19, April 1947, p. 66-74.

Use of conveyers in die casting, forming, plating, and finishing operations at Brown-Lipe-Chapin Division of the General Motors Corp., Syracuse, N. Y.

25-60. Handling in the Automotive Industry. N. M. Loney. *Flow*, v. 2, April 1947, p. 43-45.

Director of works engineering, Fisher Body Division, General Motors Corp., discusses materials handling developments.

25-61. Engine Assembly. *Automobile Engineer*, v. 37, March 1947, p. 90-97.

System employed in the marshalling stores at Austin Motor Co., Ltd. The stock turnover and size of the contingency stocks. Interesting transport and storage facilities. Assembly lines.

25-62. Material Handling in the Structural Shop. E. O. Thomas. *Fasteners*, v. 4, no. 1, 1947, p. 15-17.

Facilities available at Moore Dry Dock Co. and Belmont Iron Works.

25-63. Research in Physical Metallurgy. G. S. Farnham. *Canadian Mining and Metallurgical Bulletin*, April 1947, p. 205-214.

Outstanding developments since World War I, and comparison of Canada's efforts with those of England, Germany, and the United States.

25-64. The Hands of Cranes and Hoists. *Flow*, v. 2, May 1947, p. 22-24, 26.

Widely used, basic designs for the "grabs" of overhead handling equipment.

25-65. Continuous Flow for Axle Housings. *Flow*, v. 2, May 1947, p. 30-33, 64.

Materials-handling system used by Midland Steel Products Co., Cleveland, during fabrication of automotive axle housings.

25-66. Modernizes Malleable Iron Foundry. Erle F. Ross. *Foundry*, v. 75, May 1947, p. 72-76, 222, 224, 226.

Describes modernized foundry of Oliver Corp., Chicago. Outstanding features are maximum utilization of mechanical handling of raw materials; and conveyerization of molds, pouring operations, and castings processing.

25-67. A Plan for Cutting Production Cost. S. W. Gibb. *Iron Age*, v. 159, May 1, 1947, p. 54-57.

A simple three-step plan which enables management to spot expensive and time-consuming handling situations and to plan corrective action.

25-68. Mellon Institute Enters the Post-war Era. *Chemical and Engineering News*, v. 25, May 5, 1947, p. 1265-1270.

Review based on the contents of the 34th Annual Report of the Director. Work was done in pure chemistry, chemical physics, ceramics, metallurgy, fuels, protective coatings, and other fields.

25-69. Engineering Approach to Materials Handling. R. W. Mallick and J. H. Sansonetti. *Steel*, v. 120, May 5, 1947, p. 102-103, 144-146.

Example cited involves the shipping

of motor brackets from one foundry to another plant about 150 miles away. Development of collapsible-type container resulted in 45% saving, while breakage was reduced to less than 2%. (From paper presented before Materials Handling Exposition, Cleveland, Jan. 16, 1947.)

25-70. Three Systems for Handling and Storing Metal Chips. S. Reibel. *Transactions of the American Society of Mechanical Engineers,* v. 69, May 1947, p. 413-420.

An aluminum-chip pneumatic handling and carloading system; a mechanical method of disposing of steel chips and turnings; and a new system of mechanical handling with gravity carloading features.

25-71. Method of Mechanical Handling of Gear Blanks at Westinghouse. O. P. Adams. *Machine and Tool Blue Book,* v. 43, May 1947, p. 151-152, 154, 156.

A picture-story of Westinghouse's efficient method of assuring a smooth flow of production from fabrication of gear blanks to final packing.

25-72. Handling Large Gears in Production. O. P. Adams. *Metal Progress,* v. 51, May 1947, p. 776.

Materials-handling methods used during heat treating of gears.

25-73. Institute Papers Depict Technological Trends in Steel Industry. *Steel,* v. 120, May 26, 1947, p. 114-116, 119-120, 122.

Abstracts of papers presented at meeting of American Iron and Steel Institute in New York, May 21 to 22, 1947.

25-74. An Improved Method of Removing Openhearth Slag. L. P. Lias. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 78-81; discussion, p. 81-84.

Mechanical method and equipment.

25-75. Maintenance of Slag Thimbles and Cars. E. H. Leathers. *Proceedings of the 29th Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.,* v. 29, 1946, p. 116-118; discussion, p. 118-119.

Various types that are in use and the commonest kinds of damage to this equipment.

25-76. Material Handling in Malleable Processing. N. J. Henke. *American Foundryman,* v. 11, May 1947, p. 48-52.

The general principles of good material handling in a processing department and the economies and improvements that can be realized by their application.

25-77. Steel Warehouse Goes Modern. *Western Machinery and Steel World,* v. 38, May 1947, p. 94-97.

Plant and equipment of the Earl M. Jorgensen Co.

25-78. Western Metal Show Highlights. *Western Metals,* v. 5, May 1947, p. 34-35.

Reviews some of the technical papers presented at the exposition.

25-79. The Chemical News Parade. Tungsten Rod and Wire Production. *Chemical and Engineering News,* v. 25, May 19, 1947, p. 1442-1443.

Process followed by Sylvania Electric Products, Towanda, Pa.

25-80. Mechanical Backs Bear the Burdens. Harry S. Wharen. *American Machinist,* v. 91, May 22, 1947, p. 97-99.

Materials-handling procedures in production of Autocar trucks.

25-81. Screw Machine Engineering Data Sheet. *Screw Machine Engineering,* v. 8. May 1947, p. 63.

Weights of round, square, and hexagonal steel bars.

25-82. Twelve Ways to Handle Enameled Ware in the Spray Room. *Ceramic Industry,* v. 48, June 1947, p. 52, 54.

Conveying methods.

25-83. Grabs at Work. *Flow,* v. 2, June 1947, p. 16-18, 70.

Use of hooks and grabs of various types for miscellaneous materials-handling operations.

25-84. Liquid Nitrogen Subzero Cools Parts for Expansion Fitting. E. J. Tangerman. *American Machinist,* v. 91, June 5, 1947, p. 144-145.

Equipment and procedures.

25-85. Expansion Fits With Liquid Nitrogen. *American Machinist,* v. 91, June 5, 1947, p. 151, 153.

Linde Air Products Co. gives details of techniques and methods of calculation.

25-86. Progress in Modern Steel Works Layout. A. G. Arend. *British Steelmaker,* v. 13, May 1947, p. 250-253.

Certain South American improvements.

25-87. Water-Tube Boilers for Iron and Steel Works. *Journal of the Iron and Steel Institute,* v. 156, May 1947, p. 90-97.

Modern water-tube boiler-plant practice with special emphasis on its application to present conditions in the iron and steel industry.

25-88. Developments in the Aluminum Industry. E. G. West. *Metallurgia,* v. 36, May 1947, p. 39-43.

Alloy, process, and application developments.

25-89. Review of A.S.T.M. Research Activities. *ASTM Bulletin,* May 1947, p. 30-42.

Information on a large number of projects and the results of detailed studies.

25-90. Flat Car Conveyer System Serves 66-In. Hot Strip Mill. *Steel,* v. 120, June 16, 1947, p. 98.

Unique system in mill of Weirton Steel Co., Weirton, W. Va.

25-91. Expanded Toolsteel Facilities. R. J. Knerr and H. C. Bigge. *Steel,* v. 120, June 16, 1947, p. 110, 112, 114, 117, 132.
New equipment for controlled cooling and inspection, new cranes and rolling equipment, and other innovations at Bethlehem Steel.

25-92. Physical Burden Reduced in New Cadillac Foundry. Frank M. Scotten. *Production Engineering & Management,* v. 19, June 1947, p. 51-55.
Materials-handling and plant layout.

25-93. Materials Handling—A Profit Factor. R. W. Mallick and J. H. Sansanetti. *Steel Processing,* v. 33, June 1947, p. 341-344.
Value of using improved methods for the above and for plant layout illustrated by examples from experience at Westinghouse.

25-94 British Laboratory for Physical Metallurgy. Tom Bishop. *Metal Progress,* v. 51, June 1947, p. 960-961.
Work to be done by sections on general physics, instruments, heat and thermodynamics.

25-95. Forging Production Readings Provided by Combustion Safeguard. *Steel,* v. 120, June 23, 1947, p. 112.
How photo-electric eye circuit counts forging production. Such units are usually used to shut off fuel when combustion fails.

25-96. How Mechanization Has Helped Sibley Foundry. *Link-Belt News,* v. 14, June-July 1947, p. 1, 5, 7.
Materials-handling procedures in gray-iron foundry of Sibley Machine & Foundry Corp., South Bend, Ind.

25-97. Engineering Shop Notes. *Materials & Methods,* v. 25, June 1947, p. 136-137.
Projection welding of cabinet latches cuts assembly cost, by Wallace A. Stanley. Brush plating for small jobs, by George Black. Heat treating fixture for cyanide bath, by C. E. Garwood. Plastic blanket for chromium plating baths. Broaching 20 notches in one operation.

25-98. The Office of Naval Research. H. G. Bowen. *Welding Journal,* v. 26, June 1947, p. 489-493.
An address before the Joint Meeting of the American Society for Metals and the American Welding Society, Dec. 11, 1946, Washington, D. C.

25-99. Minerals for Chemical and Allied Industries: A Review of Sources, Uses and Specifications. Part XII. Sydney J. Johnstone. *Industrial Chemist,* v. 23, June 1947, p. 341-350.
Whiting (calcium carbonate) and lithium compounds. (To be continued.)

25-100. The Steel Industry Grows With the West. Ralph G. Paul. *Western Machinery and Steel World,* v. 38, June 1947, p. 80-93.
Brief description of history and present status of six Western steel plants (Geneva, Colorado Fuel & Iron, Fontana, Columbia, Bethlehem Pacific, and Western Steel).

25-101. Metalworking Industry Gets Real Benefit From Atomic Pile. Gene Hardy. *Iron Age,* v. 160, July 10, 1947, p. 108-110.
Operations of the Atomic Energy Commission in production and sale of isotopes for metallurgical uses. The uses of a few of the isotopes (carbon 14, sulphur 35, chlorine 36, calcium 35, titanium 51, and iron 59) in metallurgical research.

25-102. Effective Layout and Handling Mean Lower Costs, More Production. Harry S. Wharen. *American Machinist,* v. 91, July 17, 1947, p. 114-115.
How switchbox production at Square D benefits from straight-line flow and fast conveyerized handling.

25-103. Steel Plant and Foundry Application of Mercury Arc Rectifiers. S. R. Durand. *Steel,* v. 121, July 14, 1947, p. 102, 104, 107, 136.
Types used. Advantages and disadvantages compared with motor-generator sets.

25-104. Metallurgical Topics. *Engineer,* v. 183, June 27, 1947, p. 562-563.
Review of a paper by Hermann Kästner (*Stahl und Eisen,* Jan. 2, 1947, p. 10-19) which described a new continuous casting process for nonferrous alloys and indicated its possibilities for steel casting; a discussion of a French paper on cementation by beryllium; and a review of a Belgium conference on new applications of the rare metals.

25-105. Steam Turbines for Iron and Steel Works. I. V. Robinson. *Blast Furnace and Steel Plant,* v. 35, July 1947, p. 842, 844-846, 848.
Power stations for iron and steel works are increasingly efficient. Working pressures and temperatures of various installations. Capacities of turbines, types of condensers in use. (Paper read before British Iron and Steel Institute. To be continued.)

25-106. Making the Foundry a Good Place to Work. *American Foundryman,* v. 12, July 1947, p. 40-43.
Recommended layout and also a health program. (Condensed from paper by L. W. Woodhouse presented at 1947 New England Foundry Conference.)

25-107. Foundry Costs and Cost Controls. C. E. Westover. *American Foundryman,* v. 12, July 1947, p. 44-48.
Method based on financial and control budgets.

25-108. Tomorrow's Metallurgy. Fred P. Peters. *Scientific American,* v. 177, Aug. 1947, p. 56-58.

Future prospects.

25-109. Review of the Swiss Metal and Engineering Industries. W. M. von Orelli. *Journal of the Iron and Steel Institute,* v. 156, June 1947, p. 145-154.

Persons in chief industries. Resources in iron ores and coal. Development of metal and engineering industries. Iron and steel, alloy steel, pig iron, coal, electricity and manufacturing during World War II. Present-day problems. 14 ref.

25-110. New Metals for Old. Edward Appleton. *Foundry Trade Journal,* v. 82, June 26, 1947, p. 185-192.

Developments of past 50 years.

25-111. Screw Machine Engineering Data Sheet. *Screw Machine Engineering,* v. 8, July 1947, p. 53-54.

Weight tables for rounds and hexes in steel, brass, and aluminum; conversion factors for common alloys of the above, and for squares and octagons; and a table for material loss on cutting.

25-112. Standardized Handling Methods and Layout Integrate Material Movement. Floyd E. Bliven. *American Machinist,* v. 91, July 31, 1947, p. 78-82.

Methods used at General Electric's Erie works.

25-113. Nonferrous Metallurgy. J. C. Chaston. *Metal Industry,* v. 71, July 11, 1947, p. 28-30.

Review of a century of British progress.

25-114. Common User Research. *Metal Industry,* v. 71, July 11, 1947, p. 33.

Fulmer Research Institute, a new British metallurgical laboratory.

25-115. Industrial Research. *Product Engineering,* v. 18, Aug. 1947, p. 131-132.

Research by the railroads and by the automotive industries. (From "Research in the Mechanical Industries" by J. F. Wilkes presented before the Chicago Production Conference.)

25-116. Planning a Toolroom Heat Treating Department. Part II. R. C. Onan. *Iron Age,* v. 160, Aug. 7, 1947, p. 70-77.

Importance of utilizing proper and up-to-date accessory equipment if best results are to be attained. Recommended layouts. (Concluded.)

25-117. Compte Rendu des Travaux Presentes a la Reunion d'Automne de la Societe Francaise de Metallurgie. (Report on Work Presented at the Autumn Meeting of French Society for Metallurgy—October 22 to 24, 1946.) Paul Lacombe. *Revue de Metallurgie,* v. 43, Sept-Oct. 1946, p. 240-252.

The trend toward studies of the physics of metals—changes in crystal structure as a result of mechanical treatment—as well as the constant attempt to improve the quality of metals.

25-118. The British Iron and Steel Industry Increasing Facilities for Production, Research and Development. *Metallurgia,* v. 36, July 1947, p. 133-136, 160.

Some of the steps taken to increase production facilities and to exploit scientific knowledge.

25-119. Metallurgical Research in Germany Since the War. M. Hansen. *Journal of the Iron and Steel Institute,* v. 156, July 1947, p. 370.

Institutes in Germany that are able to work normally; the work under way.

25-120. The Iron and Steel Institute Meeting in Switzerland. *Engineering,* v 164, July 18, 1947, p. 67-68.

Reviews of papers presented. (To be continued.)

25-121. Steel Research Helps Meet Needs of Industry. Charles M. Parker. *Materials & Methods,* v. 26, Aug. 1947, p. 65-70.

Development of free-machining stainless steel.

25-122. Handling in the Flow of Production Welding. A. E. Rylander. *Industry and Welding,* v. 20, Aug. 1947, p 38-39, 58, 60-64.

How rotary conveyer and other simple fixtures aid continuous flow of materials, ease of operation and very high production potential.

25-123. Visual Layout Previews Production. Harry S. Wharen. *American Machinist,* v. 91, Aug. 14, 1947, p. 113-116.

Application of three-dimensional layouts to the planning of assembly-line and plant layout at Ford Motor Co.

25-124. Machinery on Rubber. *Western Metals,* v. 5, Aug. 1947, p. 19-21.

Application and advantages of rubber in metalworking plants.

25-125. Rubber Mountings in Industry. *Western Machinery and Steel World,* v. 38, Aug. 1947, p. 77-79, 111.

The application of the comparatively new art of vibration, noise and impact insulation. Rubber compounds having known useful and predictable engineering properties have been especially developed for these applications. Properties and advantages for carbide dies.

25-126. From Sheet Steel to Scrap—by Crane. George H. Johnson. *Flow,* v. 2, Aug. 1947, p. 24, 26, 66-67.

Crane handling of sheet steel. The same crane also serves the scrap disposal system, handling specially designed large-capacity buckets in temporary storage and car loading. Positioning of sheared stock by use of hydraulic lifting cylinders.

25-127. High Volume Production Aided by Suspended Assembly. Frank M. Scotten. *Production Engineering & Management,* v. 20, Aug. 1947, p. 73-76.

Materials handling on assembly line of Fisher Body Div., General Motors Corp.

25-128. Utilizing Mechanized Handling to Speed Maintenance. T. A. Lewis. *Factory Management and Maintenance,* v. 105, Aug. 1947, p. 110-112.

Materials-handling equipment and procedures at Bethlehem Steel.

25-129. Handling Materials for Steelmaking. Charles M. Parker. *Industrial Heating,* v. 14, Aug. 1947, p. 1296, 1298, 1300.

Materials handling equipment for all phases of steelmaking operations, from the mining of the iron ore to the shipment of the finished products.

25-130. Steam Turbines for Iron and Steel Works. I. V. Robinson. *Blast Furnace and Steel Plant,* v. 35, Aug. 1947, p. 980-982, 1000-1001.

Blower turbines, power turbines, and geared turbines; their operation and application.

25-131. Radioactive Tracers in Metallurgical Research. E. S. Kopecki. *Iron Age,* v. 160, Sept. 4, 1947, p. 60-64.

Research program under way at Carnegie Institute of Technology is one of the first large-scale uses of radioactive tracers in metallurgy by a university laboratory. An intensive study of rates of diffusion is being made.

25-132. Power, Fuel and Steam Balances for a Modern Steel Plant. *Iron and Steel Engineer,* v. 24, Aug. 1947, p. 35-43; discussion, p. 44-45.

Contains the following papers: Relation of the steel plant to its electrical power load, by A. D. Howry. Relation of the power load to the steam and fuel balances, by Howard L. Halstead.

25-133. Flexibility of Chassis Assembly Widened by Suspended Conveying System. Jervis C. Webb. *Steel,* v. 121, Sept. 8, 1947, p. 72-74, 112, 115-116, 118.

Two overhead trolley conveyers—one a powered unit running over the other—team up to overcome a mass of small and major handling problems in Chevrolet's new plant.

25-134. Smears of Titanium Metal. W. A. Wooster. *Nature,* v. 160, Aug. 23, 1947, p. 260.

When metallic titanium is rubbed against many hard surfaces, metal is left behind in the form of a silvery smear, which may be removed by acid treatment. Some surfaces (for instance, glass) lose their polish when treated in this way. Practical applications are: coating materials with a metallic layer; etching glass without HF; and forming resistances of the order of 10^{11} ohms.

25-135. Super Metals Are on Way for Turbo-Jets, Rockets, Battelle Chief Declares. *Iron Age,* v. 160, Sept. 11, 1947, p. 240, 246, 250, 252.

Excerpts from talk by Clyde E. Williams before Salt Lake City meeting of A.S.M.E. and A.I.M.E.

25-136. Visits to Works. *Iron and Steel,* v. 20, Aug. 1947, p. 410-414.

A number of Swiss firms visited during meeting of British Iron and Steel Institute.

25-137. Molybdenum—Practical Structural Material. John Gelok. *Westinghouse Engineer,* v. 7, Sept. 1947, p. 156-159.

Production, properties, applications, and future possibilities.

25-138. Tin Plate Transportation. *Steel,* v. 121, Sept. 15, 1947, p. 106, 109.

Materials-handling procedures in the tin-plate department of Carnegie-Illinois Steel Corp.'s Irvin Works.

25-139. High-Volume Scrap Metal Loading. *Flow,* v. 2, Sept. 1947, p. 22-23.

Materials-handling equipment and procedures at a scrap yard.

25-140. Drop Disposal for Forgings. *Flow,* v. 2, Sept. 1947, p. 36-38.

Drop disposal for forgings, plus better machine lay-out, has increased man-efficiency and productive hours 6%. Use of cab-controlled hoisting units on I-beam trackage in a narrow storage area.

25-141. Conveyer-Belt Operation. M. C. Dow. *Mining Technology,* v. 2, July 1947, T.P. 2212, 9 p.

Suggestions for improvement in the operation of conveying belts, based on many years experience with belts in crushing plants.

25-142. A Year of Radio-Isotopes. *Chemical and Engineering News,* v. 25, Aug. 4, 1947, p. 2202.

Atomic Energy Commission reviews the work that has been accomplished with these tools and outlines the shape of things to come.

25-143. Latest Body Assembly Techniques by Fisher. Joseph Geschelin. *Automotive Industries,* v. 97, Sept. 15, 1947, p. 28-30, 64.

Automobile underbody, front end and balloon assembly; painting procedure; welding.

25-144. Complete Car Bodies Built on Big Bertha Conveyer. *Automotive Industries,* v. 97, Sept. 15, 1947, p. 32-33.

Conveyer system at Briggs plant. Merry-go-round setup expedites assembly and welding operations on floor pans.

25-145. The Iron and Steel Institute Summer Meeting Held in Switzerland. *Metallurgia,* v. 36, Aug. 1947, p. 183-192.
Abstracts of papers and accompanying discussion.

25-146. Paint Finishing Ovens Installed on Plant Roof to Increase Production Space. *Industrial Heating,* v. 14, Sept. 1947, p. 1491-1492, 1494, 1496.
Expedient adopted by Cavalier Corp., Chattanooga, Tenn.

25-147. Automatic Safety Stops Improve Conveyer Efficiency. Jack Boden. *American Machinist,* v. 91, Sept. 25, 1947, p. 104-105.
Safety stops, actuated by end bumpers on roller conveyers and transfer, prevent assembled motor frames from falling off conveyers.

25-148. Trends in Nickel Alloys. *Western Machinery and Steel World,* v. 38, Sept. 1947, p. 134.
Trends in stainless steels, high-temperature alloys, alloy cast irons, cast bronzes, and high-nickel irons.

25-149. Clad Steels. *Materials & Methods,* v. 26, Sept. 1947, p. 97.
Properties of materials used; forming; machining; shearing and punching; flame cutting; welding; heat treating; cleaning; finishing; and applications.

25-150. Incendiary Action of Electric Sparks in Relation to Their Physical Properties. F. J. Llewellyn. *Transactions of the Institution of the Rubber Industry,* v. 23, June 1947, p. 29-34.
Preparation of fundamental data from which the electrostatic hazard associated with a particular process and plant can be estimated consists of 2 separate investigations—determination of electrification of the material during processing and determination of the minimum electrostatic energy necessary to produce ignition. Apparatus and procedures for these determinations Data for several metallic and plastic powders, and for vapor-air mixtures.

25-151. Handling and Storing of Light Metals. Benjamin Melnitsky. *Light Metal Age,* v. 6, Sept. 1947, p. 10-11, 20.
How the basic attributes of aluminum and magnesium—lightness and resistance to corrosion—should contribute to economical storekeeping and materials-handling methods.

25-152. Maintenance in the Boilerhouse. L. D. Hoadley. *Iron and Steel Engineer,* v. 24, Sept. 1947, p. 51-52.
Some maintenance practices in a steel-mill powerhouse. (Presented at A.I.S.E Detroit District Section Meeting, Nov 12, 1946.)

25-153. Speeding Openhearth Charging. R. J. Harry. *Iron and Steel Engineer,* v 24, Sept. 1947, p. 68-71; discussion, p 71-72.
This has assumed increased importance because of new developments in openhearth practice. (Presented at A.I.S.E. Pittsburgh District Section Meeting, April 14, 1947.)

25-154. Jacking-up a Blast Furnace Shell. John Neary. *Iron and Steel Engineer,* v. 24, Sept. 1947, p. 79-82.
Procedure for leveling the No. 5 blast furnace at Sparrows Point while renewing a portion of the shell. (Presented at A.I.S.E. Philadelphia District Section Meeting, April 5, 1947.)

25-155. Abstracts of Papers to be Presented at A.I.S.E. Annual Convention, William Penn Hotel, Pittsburgh, Pa., September 22, 23, 24, 25, 1947. *Iron and Steel Engineer,* v. 24, Sept. 1947, p. 86-97.

25-156. Wartime Expansion of Carnegie-Illinois Steel Corp. in the Pittsburgh District. T. J. Ess. *Iron and Steel Engineer,* v. 24, Sept. 1947, p. CI-13—CI-32
Additional blast furnaces, electric and openhearth furnaces, and rolling mills have added tremendous capacity to the plants.

25-157. Aluminum and Its Alloys. Hugh P. Vowles. *Canadian Metals & Metallurgical Industries,* v. 10, Sept. 1947, p 26-27.
A brief review.

25-158. Notices of Works Visited During the Centenary Celebrations. *Institution of Mechanical Engineers Proceedings,* v. 156, Sept. 1947, p. 224-241.
Descriptions of 34 British industrial plants.

25-159. Directory of Materials. Fourteenth Edition. *Machine Design,* v. 19, Oct. 1947, p. 179-240, 242, 244, 246.
Three major listings. The first presents materials by trade names in alphabetical order and includes brief data on properties, characteristics, and representative applications. The second is an index by types. The last is an alphabetical listing of producers giving complete addresses along with trade names and types of materials. Includes a single listing—"Stainless Steels"—immediately following the list of materials by trade names which presents brief data on properties, characteristics, uses and forms, and is accompanied by a list of producers, types of stainless produced, and trade names.

25-160. Condensed Review of Some Recently Developed Materials—Arranged Alphabetically by Trade Names. *Machinery,* v. 54, Oct. 1947, p. 169-181.
Table of properties and applications.

25-161. Streamlined Handling of Dies and Stampings. *Tool & Die Journal,* v 13, Oct. 1947, p. 65-66, 119-121, 133.
Use of hydraulic feed-table conveyers.

25-162. Toolsteel Progress During 30 Years. Arthur T. Clarage. *Metal Progress,* v. 52, Oct. 1947, p. 568-571.

Story of Columbia Tool Steel Co. shows how the industry modernized its equipment and its viewpoint in pace with the requirements of its customers.

25-163. New Ideas in Conveyerized Assembly. Chester S. Ricker. *American Machinist,* v. 91, Oct. 9, 1947, p. 96-100

Some new automobile-assembly procedures.

25-164. Jones & Laughlin Open New Iron Ore Research Lab. at Negaunee, Mich. *Skillings' Mining Review,* v. 36, Oct. 11, 1947, p. 1-2.

Describes and illustrates facilities.

25-165. The Story of Malleable Platinum. M. Schofield. *Endeavour,* v. 6, July 1947, p. 125-128.

An historical review. 22 ref.

25-166. Minerals for Chemical and Allied Industries. A Review of Sources, Uses and Specifications. Part XIII. Sydney J. Johnstone. *Industrial Chemist,* v. 23, Sept. 1947, p. 619-625.

For manganese and mercury. (To be continued.)

25-167. The Iron and Steel Engineers Group Report of the Fourth Meeting. Discussion on Gas Turbine Applications in Iron and Steel Works. A. T. Bowden, W. H. Gibson, J. W. Railly, and R. G Voysey. *Journal of the Iron and Steel Institute,* v. 157, Sept. 1947, p. 115-130.

Paper with discussion by R. J Welsh, T. W. Thursfield, B. Wood, J. Calderwood, F. E. Baumann, and R P. Towndrow, and authors' replies.

25-168. Cooperative Research Activities. *Metallurgia,* v. 36, Sept. 1947, p. 253-267.

Recent work of the various British metallurgical research associations, such as the British Iron and Steel Research Assoc.; British Non-Ferrous Metals Research Assoc., by W L. Hall: the British Refractories Research Assoc., by A. E. Dodd; the British Cast Iron Research Assoc., by J. G. Pearce; and the British Welding Research Assoc., by F. A. Fox.

25-169. Economics of High-Pressure Steam for Steel Mill Power. F. A. Sawyer. *Iron and Steel Engineer,* v. 24, Oct. 1947, p. 44-49; discussion, p. 49-50.

14 ref. (Presented at A.I.S.E. Annual Convention, Cleveland, Ohio, Oct. 1, 1946.)

25-170. Storage Yard Materials Handling. Frank C. Wier. *Iron and Steel Engineer,* v. 24, Oct. 1947, p. 51-57; discussion, p. 57-58.

Plan followed at Timken Roller Bearing Co. (Presented at A.I.S.E. Annual Convention, Cleveland, Oct. 3, 1946.)

25-171. Maintenance of Steel Mill Cranes. A. J. F. MacQueen. *Iron and Steel Engineer,* v. 24, Oct. 1947, p. 72-76; discussion, p. 76-78.

Presented at A.I.S.E. Buffalo District Section Meeting, March 11, 1947.

25-172. Improved Processing Carriers Can Cut Costs. C. H. Weber, Jr. *Industrial Heating,* v. 14, Oct. 1947, p. 1635-1636, 1638, 1640, 1642.

Results of experiments with different types of trays and baskets, for use in brazing and heat treating.

25-173. Indian Iron and Steel. J. S. Vatchagandhy. *Iron and Steel,* v. 20, Oct. 1947, p. 485-491.

Recent developments in the industry.

25-174. Tracer Isotopes in Metallurgy. J. K. Stanley. *Nucleonics,* v. 1, Oct. 1947, p. 70-77.

Applications to the study of fundamental problems, oxidation, corrosion, metallography, process control, annealing, and analytical procedures. 40 ref.

25-175. Cadillac Reorganizes Electroplating Dept. for Greater Efficiency. Joseph Geschelin. *Automotive Industries,* v. 97, Oct. 15, 1947, p. 28-29, 82.

Materials-handling procedures.

25-176. Floating Storage at Chevrolet—Flint. *Flow,* v. 3, Oct. 1947, p. 40-45, 54-56.

Use of more than 11,000 ft. of overhead chain conveyer for processing and floating storage of pressed-metal parts.

25-177. Research Laboratories of the Reclamation Bureau. Part IV. Solving Office and Field Problems. Douglas McHenry and Jacob E. Warnock. *Engineering News-Record,* v. 139, Oct. 30, 1947, p. 69-73.

Examples of how facilities are coordinated in the solution of design and construction problems. Special tests permit determination of true stresses in reinforcing steel, a quick measure of concrete permeability using a silver electroplating method, and the visualization of impact stresses by means of a cathode-ray oscillograph.

25-178. Looped Conveyer Saves Space. Arnold Ristow. *American Machinist,* v. 91, Nov. 6, 1947, p. 106-108.

Improved conveyer layout saved $18,000 during first year of operation in assembly and testing of special pneumatic heavy-duty switches in Allis-Chalmers plant.

25-179. Ultrasonics in Solids. S. Young White. *Audio Engineering,* v. 31, Oct. 1947, p. 22-24, 41-42

Industrial applications include dental grinding; silent riveting; heating effects; casting of metals; welding; very high power generation; and use in centrifugal pumps.

25-180. Truck for Each Job Achieves Smoother Materials Flow. *Steel,* v. 121, Nov. 10, 1947, p. 120, 123.

Use of electric trucks in tin-plate department of Jones & Laughlin.

25-181. Zusammenhänge der Wärme- und Energiewirtschaft mit den Erzeugungsverhältnissen von Grösseren Huttenbetrieben. (Relation Between Heat and Energy Consumption and the Producing Capacity of Large Iron Works.) Friedrich Wesemann. *Stahl und Eisen,* v. 66-67, Jan. 30, 1947, p. 35-42.

A comparative evaluation of war and prewar statistical data results in discovery of a relationship between the heat and energy consumption and the producing capacity of different iron works.

25-182. Three London Engineering Exhibitions. P. Grodzinski. *Industrial Diamond Review,* v. 7, Oct. 1947, p. 289-295.

25-183. Hanover Trade Fair, 1947. Paul Grodzinski. *Industrial Diamond Review,* v. 7, Oct 1947, p. 296-298.

Some of the exhibits at German fair.

25-184. Engineering Shop Notes. *Materials & Methods,* v. 26, Nov. 1947, p. 110.

Degreasing and soldering in one operation by use of infrared. Use of magnets for clamping of parts during miscellaneous operations.

25-185. Trolley Conveyers. Sidney Reibel. *Factory Management and Maintenance,* v. 105, Nov. 1947, p. 105-116.

A manual.

25-186. In Handling These Stampings, You Can Multiply the Savings by Two. *Flow,* v. 3, Nov. 1947, p. 22-23, 78.

Use of fork trucks for materials handling.

25-187. Small Layout—Big Volume. *Flow,* v. 3, Nov. 1947, p. 32-35, (

Materials-handling methods in assembly of refrigeration compressors.

25-188. Is Protection of Finish One of Your Handling Problems? *Flow,* v. 3, Nov. 1947, p. 40-46.

Method of protecting the finish on die-cast components for automobile grille assemblies.

25-189. New Metals for Old. Edward Appleton. *Engineering Materials and Processes,* v. 5, Oct. 1947, p. 127-130.

Condensed from Tenth Edward Williams Lecture delivered at Annual Conference of Institute of British Foundrymen.

25-190. American Brake Shoe Co. Mechanizes Handling of Chilled Car Wheels Through Process. *Storage Battery Power,* v. 17, Oct. 1947, p. 10-13.

Use of lift trucks.

25-191. Physics Laboratory of the British Iron and Steel Research Assoc. *Engineer,* v. 184, Oct. 31, 1947, p. 410-411.

25-192. Service Watchword in Steel Jobbing. Ralph G. Paul. *Western Machinery and Steel World,* v. 38, Nov. 1947, p 74-77, 95-97.

How Ryerson tests the steel they obtain from the manufacturer and furnishes a detailed report to the customer.

25-193. The Metallurgist and Atomic Energy. Robert F. Bacher. *Metal Progress,* v. 52, Nov. 1947, p. 800-802.

The part of the metallurgist in past, present, and future developments. Applications of radioisotopes in metallurgical research. (Presented at meeting of American Society for Metals, Chicago, Oct. 23, 1947.)

25-194. Heat Transfer to Molten Metals. R. C. Martinelli. *Transactions of the A.S.M.E.,* v. 69, Nov. 1947, p. 947-956; discussion, p. 956-959.

A theoretical development. The relative importance of the thermal resistances of the laminar sublayer, buffer layer, and turbulent core; temperature distribution in the fluid for various magnitudes of the Prandtl modulus. The unit conductance for convective heat transfer is proportional to the square root, rather than to the first power, of the friction tractor. 20 ref.

25-195. Oxygen for Industry. Earl P. Stevenson. *Technology Review,* v. 50, Nov. 1947, p. 32-35, 62, 64.

New processes making possible large production, high purity, and low cost, which pave way for increased industrial utilization for oxygen.

25-196. Cutting Costs by Cost-Cutting Tooling. *Modern Industry,* v. 14, Nov. 15, 1947, p. 45-49.

Miscellaneous cost-saving techniques used in production of both metallic and nonmetallic products.

25-197. Latest Developments in Metallurgy and Automatic Control Revealed at Boston Meeting of Electrochemical Society. *Steel,* v. 121, Nov. 17, 1947, p. 98-100, 108, 110, 113.

25-198. Continuous Casting Research Planned by British. *Iron Age,* v. 160, Nov. 20, 1947, p. 84.

This and other metallurgical research to be investigated at the new physics department of the British Iron & Steel Research Assoc.

25-199. Portsmouth Steel Corp. Is Well Under Way on Modernization Program. *Steel,* v. 121, Nov. 24, 1947, p. 64-65, 122.

25-200. Research Brains for Hire. John R. Kinsey. *Popular Mechanics Magazine,* v. 88, Dec. 1947, p. 100-103.

A few of the many projects and successful research developments at Battelle Memorial Institute.

25-201. The Research and Development Station of the Vereinigte Aluminium Werke Aktiengesellschaft. *Aluminium and the Non-Ferrous Review,* v. 12, July-Sept. 1947, p. 49-52.

25-202. Shop Handling of Magnesium. Gilbert C. Close. *Light Metal Age,* v. 5, Nov. 1947, p. 22-23.

Methods used at Northrop Aircraft in handling, to prevent damage, and in fabrication.

25-203. A Punch Card Filing System for Metallurgical Literature. A. G. Guy and A. H. Geisler. *Metal Progress,* v. 52, Dec. 1947, p. 993-1000.

Convenient personal filing system. Subject index for the system.

25-204. The Research Organization of the American Electroplaters' Society. Richard M. Wick. *Monthly Review,* v. 34, Dec. 1947, p. 1368-1375.

25-205. Coordinating Materials Handling With the Manufacturing Cycle. S. C. Hoey. *Mechanical Engineering,* v. 69, Dec. 1947, p. 1007-1011.

Materials-handling problem in general; some solutions by experience obtained at Westinghouse Electric Corp.

25-206. Materials and Power. Clyde Williams. *Mechanical Engineering,* v. 69, Dec. 1947, p. 1012-1015.

Recent and potential developments in utilization of raw materials and in power generation, with emphasis on the part played by large-scale industrial research in all of these developments. Importance of new metallurgical developments in facilitating advances in diverse fields.

25-207. Planned Handling. R. O. Erickson. *Steel,* v. 121, Dec. 15, 1947, p. 95, 112.

Recent revisions in the materials-handling system at Morse Chain Co., manufacturers of roller, power, and automotive chain.

25-208. How to Mark Hard Plastics. H. O. Bates. *American Machinist,* v. 91, Dec. 18, 1947, p. 119.

New process called oil engraving can also be used on aluminum. The metal or plastic is immersed in a thin oil during the engraving process.

25-209. Electric Hand Trucks Increase Freight Carloads. *Iron Age,* v. 160, Dec. 25, 1947, p. 79.

Freight carloads have been increased 24% through use of small size, electric, hand-guided trucks.

25-210. Beryllium and Beryllium Bronze (Beryllium Copper). (Continued.) Robert Gadeau. *Microtechnic (English Section),* v. 1, Oct. 1947, p. 111-114. (Translated from the French.)

Used in cast alloys; rolling and drawing; forging, and stamping; deep-drawing; turning (including new test data); welding; heat treatment; pickling, electroplating; analysis; and miscellaneous uses. (For illustrations, see *French Section,* p. 245-255.)

25-211. Handling Coiled Steel. John D. O'Roark. *Flow,* v. 3, Dec. 1947, p. 32-34.

Materials-handling methods at Weirton Steel Co.

25-212. Many Lines Build the Finished Product. *Flow,* v. 3, Dec. 1947, p. 42-47.

Materials-handling procedures at Philco's new refrigerator and freezer plant in Philadelphia.

25-213. Growth of the Beryllium Industry. C. B. Sawyer. *Nucleonics,* v. 1, Dec. 1947, p. 81-85.

25-214. Metallurgical Progress and the Mining Industry. L. Sanderson. *Mine & Quarry Engineering,* v. 13, Dec. 1947, p. 367-369.

New developments in metallurgy, especially as applicable in mining.

SECTION XXVI

STATISTICS

26-1. Steel Use by States. O. L. Johnson. *Iron Age,* v. 159, Jan. 2, 1947 p. 72-75.

Consumption of steel by strictly metalworking plants on a state-by-state basis.

26-2. World Steel Production. J. R. Hight. *Iron Age,* v. 159, Jan. 2, 1947. p. 88-95.

Of the major producers, Russia and England have maintained wartime peaks as contrasted with the 23,000,000-ton decline in the United States. German output is but a tenth of the prewar level, while France is producing at a rate equal to 50% of its 1939 volume.

26-3. Metallurgy. E. S. Kopecki. *Iron Age,* v. 159, Jan. 2, 1947, p. 96-103.

Some of the technological advances that have aroused considerable interest during the past year in such fields as high-temperature metals, high-temperature ceramics, the light metals, powder metallurgy, inspection and testing, and hardenability concepts.

26-4. Nonferrous Metals. John Anthony. *Iron Age,* v. 159, Jan. 2, 1947, p. 104-109.

Nonferrous metal industry in 1946. Supplies of most metals ran short of demand, and prices, paced by heavy foreign buying, moved sharply higher. All indications are for still higher levels to be reached in 1947. Scrap supplies, long feared as a likely drug on the market, disappeared without major effect on the major nonferrous markets.

26-5. U. S. Stockpiles. Karl Rannells. *Iron Age,* v. 159, Jan. 2, 1947, p. 116-119.

With 100 million dollars assigned for stockpiling purchases in 1946, and the probability of this sum being at least doubled in 1947, considerable caution will be required by government agencies if such purchases are not to seriously affect domestic price levels.

26-6. Ore and Coal. W. A. Lloyd. *Iron Age,* v. 159, Jan. 2, 1947, p. 126-133.

Problems of ore reserves and attempts to better the situation by means of beneficiation studies and development of foreign sources.

26-7. Scrap Supplies. T. E. Lloyd. *Iron Age,* v. 159, Jan. 2, 1947, p. 134-139.

1947 prospects.

26-8. Machine Tools. H. E. Linsley. *Iron Age,* v. 159, Jan. 2, 1947, p. 154-159.

The industry in 1946 and its prospects for 1947. Machine tool industry in the past year recorded an unspectacular 310 million-dollar sales volume. With surplus selling seen as ceasing to be a major obstacle to new sales by the end of 1947, the industry is establishing new buying interest through aggressive technological product improvement, particularly in automatic units.

26-9. Metal Finishing. Adolph Bregman. *Iron Age,* v. 159, Jan. 2, 1947, p. 160-165.

Economic and technical developments of 1946 and prospects for 1947

26-10. Welding. H. E. Linsley. *Iron Age,* v. 159, Jan. 2, 1947, p. 166-171.

Economic and technical developments of 1946 and prospects for 1947. 10 ref.

26-11. Summarized Statistics of Production of Lead and Zinc in the Tri-State (Missouri-Kansas-Oklahoma) Mining District. A. J. Martin. *Bureau of Mines Information Circular* 7383, Nov. 1946, 67 p.

26-12. Iron Ore Reserves of the Lake Superior District. E. W. Davis. *Mining and Metallurgy,* v. 28, Jan. 1947, p. 15-18.

Future prospects. Shortage of high-grade must make some companies turn shortly to taconite concentration or imported ore.

26-13. Shortages Thwart Europe's Recovery. Vincent Delport. *Steel,* v. 120, Jan. 6, 1947, p. 312-313, 372-375.

Economic rehabilitation efforts handicapped by inadequate supplies of coal, steel, scrap and other raw materials as well as manpower crisis.

26-14. British Push Steel Industry Modernization. J. A. Horton. *Steel,* v. 120, Jan. 6, 1947, p. 314-135, 364-365.
Improvement programs proceeding with proposal to nationalize the industry temporarily shelved. Manufacturing industries make headway slowly with steel supply short.

26-15. French Industry's Progress Hinges on Coal. Leon Jaudoin. *Steel,* v. 120, Jan. 6, 1947, p. 316-317, 366-368.
Unless fuel shortages and inflation dangers are corrected, the nation's steel industry will be unable to regain its prewar status, to the detriment of dependent consuming lines.

26-16. Steel Exports to Expand as Supply Permits. B. K. Price. *Steel,* v. 120, Jan. 6, 1947, p. 318-319, 370-371.
1947 prospects, which include high foreign demand and trend toward return of foreign trade to private enterprise.

26-17. 1946 Domestic Market Summary. William M. Rooney. *Steel,* v. 120, Jan. 6, 1947, p. 320-321, 376-381.
Production and consumption statistics.

26-18. Latin America—The Possibilities of Industrialization. The United States of Brazil. *British Steelmaker,* v. 13, Jan. 1947, p. 10-19.
Mineral resources of Brazil; principal steel mills; statistical information.

26-19. Appraisal of Metalworking With a Statistical Summary. *American Machinist,* v. 91, Jan. 16, 1947, p. 101-116.
Data on machine tools and other production equipment, on output of metals, components and finished products and information on orders, wages and prices.

26-20. Foreign Ore Reserves of Copper, Lead, and Zinc. William P. Shea. *Engineering and Mining Journal,* v. 148, Jan. 1947, p. 53-58.
Comprehensive survey of foreign ore reserves, production, and requirements demonstrates that foreign ore reserves and capacities are also limited.

26-21. Notes on the Japanese Magnesium Industry. Donald L. Colwell. *Metal Progress,* v. 51, Jan. 1947, p. 67-70.
Various processes used. Tables give annual magnesium production for Japan proper, Korea, and Formosa, and examples of Japanese magnesium alloy specifications.

26-22. Iron and Steel Industry Progress in the Urals. A. N. Speransky. *Metallurgia,* v. 35, Dec. 1947, p. 67-68.
Since the revolution, great progress has been made in developing the iron ore resources of this area. Some of these developments; potentialities of the area.

26-23. Developments in the Iron and Steel Industry During 1946. *Iron and Steel Engineer,* v. 24, Jan. 1947, p. 67-85.
Expansions in facilities and introduction of new plant practices. Includes list of electric motors of over 300 hp. applied to main roll drives in iron and steel and allied industries during 1946, giving characteristics, drive method, kind of mill, purchaser, location and manufacturer.

26-24. The Aluminum Industry in Germany. *Mine & Quarry Engineering,* v. 13, Jan. 1947, p. 23-24.
Light metal industry prohibited in Germany now; importation controlled. Germany led Europe in application of light metals, under government control. Supplies of aluminum. (Reprinted from *British Zone Review,* Nov. 9, 1946.)

26-25. Shasta and California Iron-Ore Deposits—Shasta County, Calif. Part K. Carl A. Lamey. *State of California, Division of Mines Bulletin* 129, Part K, Oct. 1946, 164 p.
Results of survey.

26-26. Chromite Deposits of the Northern Coast Ranges of California. Part II. Coast Ranges. D. H. Dow and T. P. Thayer. *State of Cailfornia, Division of Mines Bulletin* 134, part II, c. I, Dec. 1946, 38 p.
Results of survey.

26-27. Alaska's Minerals as a Basis for Industry. H. Foster Bain. *Bureau of Mines, I. C.* 7379, Dec. 1946, 89 p.
An economic survey covering resources of metallic and nonmetallic minerals, coal, and petroleum.

26-28. Platinum Metals Industry Is Returning to Normal Status Under Free Market Conditions. Charles Engelhard. *Metals,* v. 17, Jan. 1947, p. 10.
Speculators forced price to $93.00, followed by recession; sales to consumers averaged 19,775 troy oz. monthly.

26-29. Metal Conservation—a National Problem. C. Gerard Davidson. *Metals,* v. 17, Jan. 1947, p. 11-14.
Country's natural reserves of antimony equivalent to 4 years' supply; lead, 12 years'; cadmium, 16 years'; zinc, 19 years'; copper, 34 years'; platinum, 2 years'; and tungsten, 4 years'.

26-30. The Sheet Metal Outlook for 1947. R. C Todd. *Finish,* v. 4, Feb. 1947, p. 25, 54, 56.
The current picture and estimates of future supply.

26-31. Mineral Economics. Elmer W. Pehrson. *Mining and Metallurgy,* v. 28, Feb. 1947, p. 50-55.
1946 production and prices of the various metallic and nonmetallic minerals. 1947 trends.

26-32. **Mining Geology.** Carlton D. Hulin. *Mining and Metallurgy,* v. 28, Feb. 1947, p. 56-58.

New ore discoveries and developments of 1946. We do not have to worry too much about running out of metallic minerals—given favorable government policies.

26-33. **Eastern Magnetite.** J. R. Linney. *Mining and Metallurgy,* v. 28, Feb. 1947, p 73.

Production statistics from the various mines.

26-34. **British Planning Reorganization of German Steel Industry.** Jack R. Hight. *Iron Age,* v. 159, Feb. 20, 1947, p. 106-109.

Program includes socialized industry and liquidation of old steel combine.

26-35. **Metals Survey and Forecast.** *Engineering and Mining Journal,* v. 148, Feb. 1947, p. 70-91.

Present status and future prospects from the economic point of view of the different nonferrous metals, including the minor metals, such as beryllium, cobalt, etc. A chart and tables show metal prices since 1897.

26-36. **Minerals as a Factor in U. S. Foreign Economic Policy.** Paul H. Nitze. *Department of State Bulletin,* v. 16, Feb. 16. 1947, p. 300-302.

Trade agreements program as it concerns the mineral industry.

26-37. **C.P.A. Trims O.I.T.'s Tinplate Allocation Request to 55,000 Tons.** Gene Hardy. *Iron Age,* v. 159, Feb. 27, 1947, p. 108-109.

Tinplate exports and allocations for 1946 and first part of 1947.

26-38. **Lake Superior Iron Ore Reserves for the Future Operation of the U. S. Iron and Steel Industry.** George W. Hewitt. *Skillings' Mining Review,* v. 35, March 1, 1947, p. 1-2, 4, 6, 9, 13, 15.

Discussion and statistical tabulations.

26-39. **Pricing Castings for Profit. (Concluded.)** Joseph B. Meier. *Foundry,* v. 75, March 1947, p. 108-109, 243-248.

Direct and indirect expenses and the profit factor.

26-40. **The Aluminum Industry of India.** *Aluminium and the Non-Ferrous Review,* v. 11, Oct-Dec. 1946, p. 74-75.

The organization of the aluminum fabrication companies. Importation and distribution of aluminum. Government aid and control.

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26-113. United States Faces Major Deficiencies in Many Essential Minerals and Metals. E. W. Pehrson. *Metals,* v. 18, July 1947, p. 10-12.

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26-116. Good Prospects for Indian Wire Industry. *Wire Industry,* v. 14, July 1947, p. 371, 387.

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26-127. Cobalt. Hubert W. Daves. *Bureau of Mines Minerals Yearbook Preprint,* 1946, 9 p.

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Graphs and tables give answers to the following questions: How many and what kind of machine tools will be bought? Who will supply the tooling? How much carbide tooling will be used? What operating features will be specified on new machine tools? What forming and forging equipment will be bought? What materials-handling equipment will be bought? How much air-conditioning will be installed? What heat treating, welding and metal-finishing equipment is to be bought? What officials buy production equipment? How the survey was made.

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A statistical review.

26-167. Western Metals Forum. E. T. Grether, J Lester Perry, N. H. Engle, Louis B. Lundborg, H. H. Fuller, and L. A. Johnson. *Western Metals,* v. 5, Oct. 1947, p. 28-29.

Sufficiency of Western steelmaking capacity for continued growth of Western industry.

26-168. World-Wide Wire Industry. *Wire and Wire Products,* v. 22, Oct. 1947, p. 782-785, 788-791, 794-801, 849-852.

Symposium includes article on the industry in Belgium, by A. Boddaert; Great Britain, by Reginald Smith Brown (steel wire) and by G. W. Preston (copper and copper-alloy wire); Canada, by H. D. Short (nonferrous wire and cable) and by L. H. Doering (ferrous wire); Chile, by Juan L. Carrasco; Germany (a summary based on various reports); India, by Sarup Singh Gill; Spain, by Ramon Quijano de la Colina; South Africa, by J. W. Vander Laan and C. B. Welch; Sweden, by Gosta Svensson; and Ireland, by Frank O'Neill.

26-169. Western Steel Mills. *Western Metals,* v. 5, Oct. 1947, p. 32-33.

Latest information available about the "Big Five"—Columbia, Bethlehem, Kaiser, Geneva and Colorado Fuel & Iron.

26-170. The Supply Outlook for Nonferrous Metals. Joseph P. Sherman. *Materials & Methods,* v. 26, Oct. 1947, p. 75-79.

Trends in supplies and prices.

26-171. Mushrooming Industrial Applications Brighten Aluminum Future. D. I. Brown. *Iron Age,* v. 160, Nov. 6, 1947, p. 131-134.
Survey indicates that many substitutions forced by acute steel shortage may become permanent.

26-172. Nastin Podminek Hospodarne Vyroby Huti. (Outline of Economical Conditions for Metallurgical Production.) Jindrich Sarek. *Hutnické Listy,* v. 2, Aug. 1947, p. 25-31.
Factors involved in planning the location and organization of production for new iron and steel plants. Three examples.

26-173. Secondary Metals—Nonferrous. Herbert L. Cullen and A. J. McDermid. *Bureau of Mines 1946 Minerals Yearbook Preprint,* 29 p.
Statistics derived from surveys covering all known consumers and a representative group of dealers.

26-174. Ferro-Alloys. Norwood B. Melcher. *Bureau of Mines 1946 Minerals Yearbook Preprint,* 6 p.
U. S. statistics.

26-175. Colorado Gold, Silver, Copper, Lead, and Zinc (Mine Report). S. A. Gustavson. *Bureau of Mines 1946 Minerals Yearbook Preprint,* 26 p.
Production statistics.

26-176. Tungsten. Hubert W. Davis. *Bureau of Mines 1946 Minerals Yearbook Preprint,* 13 p.
U. S. and foreign statistics.

26-177. Oregon Gold, Silver, Copper, Lead and Zinc (Mine Report). Alfred L. Ransome. *Bureau of Mines 1946 Minerals Yearbook Preprint,* 11 p.
Production statistics.

26-178. Arizona Gold, Silver, Copper, Lead and Zinc (Mine Report). C. E. Needham and Paul Luff. *Bureau of Mines 1946 Minerals Yearbook Preprint,* 25 p.
Production statistics.

26-179. Utah Gold, Silver, Copper, Lead, and Zinc (Mine Report). C. E. Needham and Paul Luff. *Bureau of Mines 1946 Minerals Yearbook Preprint,* 19 p.
Production statistics.

26-180. Montana Gold, Silver, Copper, Lead and Zinc (Mine Report). C. E. Needham and Paul Luff. *Bureau of Mines 1946 Minerals Yearbook Preprint,* 23 p.
Production statistics.

26-181. Aluminum. C. E. Nighman and Mary E. Trought. *Bureau of Mines 1946 Minerals Yearbook Preprint,* 17 p.
Statistical data, both U. S. and foreign.

26-182. Many Industrial Applications of Aluminum May Become Permanent. D. I. Brown. *Iron Age,* v. 160, Nov. 13, 1947, p. 128-130.
Concludes survey of future prospects.

26-183. Mineral Position of the United States. U. S. Government Printing Office, Washington, 1947, 7 p.
Condensed from report recently completed by U. S. Geological Survey and the U. S. Bureau of Mines. Reserves are given for each mineral as of 1944 and the relation of these reserves to rates of annual use is shown.

26-184. Zur Gegenwärtigen Lage und Lenkung der Deutschen Eisenindustrie. (The Present Status and Organization of the German Iron and Steel Industry.) Karl Peter Harten and Hans Hero Vosgeran. *Stahl und Eisen,* v. 66-67, Jan. 2, 1947, p. 2-10.

26-185. Der Gasausgleich auf Huttenwerken. (Gas Balance in Blast Furnaces.) Kurt Rummel. *Stahl und Eisen,* v. 66-67, Jan. 2, 1947, p. 19-23.
Several ways of economizing on the gas used for blast-furnace operation.

26-186. Die Erzeugung der Deutschen Eisenindustrie von 1938 bis 1944. (Production of the German Iron and Steel Industry From 1938 to 1944.) Hans Schmitz. *Stahl und Eisen,* v. 66-67, Jan. 30, 1947, p. 48-56.
Statistics for the different types of iron and steel products and compares development with that in the U. S. Map showing the location of the various German works.

26-187. Vyhlidky Soudobeho Prumyslu, Vyrabejiciho Hlinik. (Outlook of the Present Industrial Production of Aluminum.) A. Glazunov. *Hutnické Listy,* v 2, Sept. 1947, p. 49-51.
The present method of producing aluminum. It is impossible for aluminum to be produced in Europe from bauxite according to the present methods to compete with overseas production.

26-188. World-Wide Wire Industry. *Wire and Wire Products,* v. 22, Nov. 1947, p. 898-903, 917-918.
Statistical reports: "Australia", by Oscar Semler. "Czechoslovakia", by Oscar Semler. "Germany", by Hubert Hermanns and Paul Fridrumuc.

26-189. Economics of Stainless Steel Production. Charles Staley. *Electric Furnace Steel Conference Proceedings,* v. 4, 1947, p. 129-130; discussion, p. 130-135.
Two methods most commonly used by Middletown division of Armco.

26-190. Brazilian Ore Resources and the Volta Redonda Plant. Ralph Vaill. *Blast Furnace and Steel Plant,* v. 35, Nov. 1947, p. 1365-1367.

Iron-ore resources and their utilization. (To be continued.)

26-191. **Minerals—The Watchdog of American Economy.** J. A. Krug. *Metals,* v. 18, Nov. 1947, p. 7, 9, 14.

Stockpiling program should not rely on foreign sources of supply to detriment of domestic producing industry.

26-192. **Strong Stockpiling Program Essential to National Security and to Conservation.** Otto Herres. *Metals,* v. 18, Nov. 1947, p. 12-14.

Fears of premature exhaustion are believed to be unfounded if newly discovered reserves are produced and stockpiled.

26-193. **Outlook for Cupola Raw Materials; Foundry Pig Iron.** Bertram S. Stephenson. *Foundry,* v. 75, Dec. 1947, p. 78-79, 226, 228, 230, 232-233.

Future supply prospects.

26-194. **Outlook for Cupola Raw Materials; Foundry Coke.** Samuel Weiss. *Foundry,* v. 75, Dec. 1947, p. 80-81, 233-234.

Supply prospects.

26-195. **Outlook for Cupola Raw Materials; Cast Scrap.** Edwin C. Barringer. *Foundry,* v. 75, Dec. 1947, p. 82-83, 222.

Steel-scrap prospects.

26-196. **Spanish Iron Ore.** H. J. Becker. *Mining Magazine,* v. 77, Nov. 1947, p. 279-280.

A survey of the industry and of its prospects.

26-197. **Stampings Star in Postwar Manufacturing Techniques.** *Steel Processing,* v. 33, Nov. 1947, p. 685-687.

Survey by Pressed Metal Institute indicates that stamping manufacturers require from 100 to 450% more steel than they were using in 1939.

26-198. **Clad Metals Makers Raise Sights to Capture New Markets.** George F. Sullivan. *Iron Age,* v. 160, Dec. 11, 1947, p. 137-139.

Several big basic steel firms are interested.

26-199. **The Pig Iron Shortage.** *Steel,* v. 121, Dec. 15, 1947, p. 61-66.

Survey of above problem as reported by 82 different foundries. Less than 20% are getting full requirements.

26-200. **Components Makers See 1948 as Good Year.** John S. Morgan. *Steel,* v. 121, Dec. 29, 1947, p. 30-31, 110.

Production, price, and demand prospects.

26-201. **The Procurement Outlook for Metal Decorators.** H. C. Hopkins. *National Lithographer,* v. 54, Dec. 1947, p. 32-33.

Supply prospects for tin-plate and other sheet metals, inks, pigments, resins, and solvents used by the metal decorator.

26-202. **How Long Will Our Metals Last?** Carle R. Hayward. *Technology Review,* v. 50, Dec. 1947, p. 96-101, 116, 118, 120, 122.

The world's supply of metals, definitely not inexhaustible, can be prolonged by international cooperation aided by conservation and research.

26-203. **The Postwar Outlook for the Foundry Industry.** E. F. Platt. *Transactions of the American Foundrymen's Association,* v. 53, 1946, p. 294-295.

Previously annotated in R.M.L., v. 2, 1945.

SECTION XXVII

BOOKS

27-1. Shot-Peening. 128 p., American Wheelabrator & Equipment Corp., Mishawaka, Ind. $1.50. (Free to executives addressing requests on company letterhead.)

First part of the book is devoted to the applications and advantages of shot-peening and the equipment and procedures involved. Second part covers theory of prestressed surfaces in relation to shot-peening.

27-2. Precision Hole Location for Interchangeability in Toolmaking & Production. J. Robert Moore. 448 p., Moore Special Tool Co., Bridgeport, Conn. $3.00.

Aims to help toolmakers accurately mass produce special tools, dies, fixtures, gages and molds. Includes 184 pages of tables prepared by W. J. Woodworth and Son, for laying out holes in circles. (From review in *Tool Engineer*, v. 17, Jan. 1947.)

27-3. Die Funkenanalyse und Haertepruefung in Betriebe. (Spark Tests and Hardness Tests for the Workshop.) E. Berner. 136 p., Schweizer Druck- und Verlagshaus, Zurich, Switzerland.

Intended as a guide for the shop man. The combination of the spark test with hardness testing is quite original. The Brinell, diamond pyramid, and Rockwell tests are dealt with mainly from the point of view of machines built in Switzerland. Reference is also made to Mohs' scale. Attention drawn to Rosival's abrasion tests. No reference is made to modern microhardness testing methods or to rebound testing. (From review in *Industrial Diamond Review*, v. 6, Dec. 1946.)

27-4. Toleranzen, Passung und Konstruktion. (Tolerances, Fits and Design.) H. Bradenberger. 318 p., SDV-Fachbuecher, Schweizer Druck- und Verlagshaus, Zurich, Switzerland.

Book is based mainly on the I.S.A. tolerance system, now accepted by nearly all countries using the metric system of measurement. Section "Surface Finish and Standardization" is not very up-to-date, and corresponds to what was known in 1938. Sections on tolerances for antifriction bearings seem to be particularly exclusive and good, as is that on the interrelation between tolerances and design. Special attention may be drawn to the tolerance investigation on statistical basis. (From review in *Industrial Diamond Review*, v. 6, Dec. 1946.)

27-5. Sir William J. Larke Medal Prize-winning Papers. The Institute of Welding, London. 7s. 6d.

Five papers for which prizes were awarded by the Council of the Institute of Welding in the Sir William J. Larke Medal Competition of 1944.

27-6. Thermodynamic Properties of Ammonium and Potassium Alums and Related Substances, With Reference to Extraction of Alumina from Clay and Alunite. K. K. Kelley, C. H. Shomate, F. E. Young, B. F. Naylor, A. E. Salo, and E. H. Huffman. 104 p., Bureau of Mines, Washington 25, D. C. (Technical Paper 688.)

Basic available thermal data are assembled and correlated in order to show the energy requirements and relationships involved in the clay and alunite processes for recovery of alumina from these materials.

27-7. Mechanical Drawing. Frederick Samuel Nicholson. 218 p., D. Van Nostrand Co., 250 Fourth Ave., New York, N Y. $2.00.

A textbook for a high school course in draftsmanship for industry.

27-8. British Cast Iron Research Association Annual Report. 12 p., British Cast Iron Research Association, Birmingham, England.

Outlines research program and other activities of the association.

27-9. Phosphorus-Iron Alloys Bulletin No. 1. 36 p., Phosphate Division, Monsanto Chemical Co., St. Louis, Mo.

Results of extensive tests on low-carbon, low-alloy steels reported in

charts and tables. Studies include influence of phosphorus on microstructure; physical properties, oxidation and scaling, and electrical properties of phosphorus steels.

27-10. Electric Furnaces in Ferrous Metallurgy. N. V. Okorokov. 440 p., State Scientific-Technical Publishing House for Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R. (In Russian.)

Intended mainly for students but should be useful also to metallurgical engineers. Covers all types of electric furnaces in operation in U.S.S.R. and abroad, indicating their main characteristics, and advantages and disadvantages when applied to different metallurgical processes. Structural designs, electrical equipment and theoretical bases for calculation and design.

27-11. The Diffraction of X-Rays and Electrons by Free Molecules. M. H. Pirenne. 160 p., Cambridge University Press, New York. $3.50.

Gives theory and information obtained by use of these methods concerning the structure of atoms and molecules. Special attention is given to hypotheses and principles underlying theories, as well as to their limits of validity. Mathematical formulas and numerical data of importance are included, but extensive mathematical developments have generally been omitted. Complete bibliography of X-ray diffraction by gases. 187 ref.

27-12. Standard Metal Directory. Edition 10. 1946, 852 p., Standard Metal Directory, New York. $10.00.

Revised directory of iron and steel plants, ferrous and nonferrous metal foundries, metal rolling mills, smelters and refiners of nonferrous metals. Includes lists of fabricators of bars, sheets, tanks, plates and structural shapes, as well as storage-battery manufacturers, sheet-metal stamping works, solder manufacturers, galvanizers, and scrap-metal dealers.

27-13. Ressorts, Etude Complète et Méthode Rapide de Calcul. (Springs, a Complete Study and Rapid Method of Calculation.) C. Reynal. Edition 4. 253 p., Dunod, Paris.

A detailed analysis of the design and action of the various kinds of springs—laminated, helical, spiral, multiple—and of spring washers. The last two chapters contain certain observations on springs in general and describe two special slide rules for making rapid calculations in spring design. (From review in *Mechanical Engineering*, v. 69, Jan. 1947.)

27-14. Metallurgical Materials, Alloys and Manufacturing Processes. V. N. Wood. Chapman & Hall, Ltd., 37 Essex St., London, W.C.2, England. 25s.

Principles of the metallurgy of the common engineering materials, their properties, treatments and manufacture. Deals with manufacture of iron and steel, mechanical testing and physical examination of metals, industrial control and measurement of temperature, heat treatment and mechanical working of steel, and carbon and alloy steels. Cast iron, malleable cast iron, and the nonferrous metals and alloys are also covered, as well as welding, galvanizing, centrifugal casting, chilled castings, and powder metallurgy. Profusely illustrated. (Review from *British Steelmaker*, v. 13, Jan. 1947.)

27-15. Controlled Atmospheres for the Heat Treatment of Metals. Ivor Jenkins. Chapman & Hall, Ltd., 37 Essex St., London, W.C.2, England.

Attempts to bridge the gap between academic and practical aspects and to promote a more general recognition of the fundamental principles underlying controlled atmosphere processes and the means of translating those principles into practice. The book is divided into three sections: generation, purification and industrial application. (Review from *British Steelmaker*, v. 13, Jan. 1947.)

27-16. Symposium on Atmospheric Exposure Tests on Nonferrous Metals. 145 p., American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Six papers and their discussions present data resulting from tests carried on over a ten-year period. The resistance of rolled zinc, nickel and monel, copper, lead and tin, and aluminum-base alloys to atmospheric corrosion is covered in the first five papers. The last paper describes the use of statistical methods in evaluation of the corrosion test data, and the discovery of reasons for erratic variations in the data. Appendices contain pertinent excerpts from previous reports.

27-17. Symposium on Materials for Gas Turbines. 199 p., American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $3.00.

Five extensive technical papers and three other papers on related subjects in the field of high-temperature materials. The mechanical properties and corrosion resistance of numerous high-temperature alloys were studied in this series. One paper also reports fundamental studies of ceramic materials for high-temperature service. Includes discussions.

27-18. Pipe in American Life. 48 p., Committee on Steel Pipe Research, American Iron and Steel Institute, 350 Fifth Ave., New York.

Historical background and modern uses of metal pipe, with emphasis on

the use of steel pipe. Chapters are devoted to uses of steel pipe in homes, large buildings, process industries, railroads, shipping, mining, water-supply systems, the oil industry, the gas industry, refrigeration, irrigation, and on farms.

27-19. Heat Treatment of Metals. E. Brooker, G. B. Berlien, George M. Huck, E. R. Mertz, William F. Nash, Jr., Edward E. Fess, H. B. Osborn, Jr., E. S. Davenport, Max Tatman, S. R. McBride. 178 p., American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $3.00.

A series of educational lectures given to the Los Angeles Chapter, A.S.M., include discussion on why heat treat, how to heat treat, results from heat treatment, why steel hardens, hardenability, practical applications and use of hardenability, induction heating, isothermal transformation in steel, improved treatments of aluminum alloys, and practical application of heat treated light metal alloys.

27-20. Talks About Steelmaking. Harry Brearley. 236 p., American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $3.50.

A pioneer steelmaker writes of the various processes employed in making steel during his experience. Discusses molten steel, melting processes, forging, testing steel, notch fractures, specifications, clean steel, scrap control and reclamation.

27-21. Jigs and Fixtures for Mass Production. Leland A. Bryant and Thomas A. Dickinson. 222 p., Pitman Publishing Corp., 2 West 45th St., New York 19, N. Y. $3.50.

Plastics, pneumatics and hydraulics as applied to tooling. Important wartime developments such as the master tooling dock. History of the subject and how it is related to industry as a whole. Designing and construction of jigs and fixtures; various types and tooling procedures.

27-22. Definition and Measurement of Gloss. V. G. W. Harrison. 145 p., Printing and Allied Trades Research Association, Charterhouse Square, London, E.C.1, England. 10s.

Study of the literature on gloss and luster, assessing present state of our knowledge on this subject. Physical, physiological, and psychological factors influencing our sensations of gloss or luster. Various methods of gloss measurement that have been tried.

27-23. Elements of Mining. George J. Young. 755 p., Fourth Edition, McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. $6.50.

Comprehensive view of mining problem emphasizing fundamental engineering principles, cost analyses, dimensional data established by mining practice. Restricted to underground methods of mining unstratified mineral deposits. Material revised since previous edition to cover present-day practice.

27-24. Machine Design. Louis J. Bradford and Paul B. Eaton. 283 p., Fifth Edition, John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $3.25.

Progress in the field since previous editions. New information on fatigue of metals, current theories on the nature of friction and lubrication, and special precautions necessary in designing parts made of aluminum. Bearings and sliding surfaces, friction clutches and brakes, toothed gearing, belts and chains are typical chapter headings.

27-25. 1946 Plating and Finishing Guidebook. Nathaniel Hall and G. B. Hogaboom, Jr. 15th Edition, 268 p., Metal Industry Publishing Co., 11 West 42nd St., New York 18, N. Y. $1.00.

Handbook for the metal finisher. Formulas of plating solutions. Methods for testing coatings and analyzing plating solutions. Sections on surface treatments, metallizing nonconductors, stripping metallic coatings, and organic finishing.

27-26. Reynolds Aluminum Alloys and Mill Products. 248 p., Reynolds Metals Co., 2500 So. Third St., Louisville 1, Ky. $2.00.

Handbook of data outlines history of aluminum, characteristics and properties of the metal, various forms of stock and how each is fabricated. 108 tables.

27-27. Welding Aluminum and Aluminum Alloys. 87 p., Reynolds Metals Co., 2500 So. Third St., Louisville 1, Ky. $1.00.

Metal-arc welding, carbon-arc welding, atomic-hydrogen welding, inert-gas-shielded welding, oxy-acetylene welding, torch, furnace and dip brazing and various forms of resistance welding as used today on aluminum and aluminum alloys. General characteristics of aluminum which affect welding practice and weldability. Metal preparation and inspection of aluminum welds. Profusely illustrated.

27-28. Plastic Molds. Gordon Thayer. Third Edition. Huebner Publications, 2460 Fairmount Boulevard, Cleveland 6, Ohio. $5.00.

Design, manufacture and use of molds. Compression mold types classified for study; transfer and jet molding; injection molds; mold sinking; applications of mold base standards; molding of screw threads. Finishing methods and equipment, including tools, machines and accessories. Plastics tooling.

27-29. Practical Color Simplified. William J. Miskella. 128 p., Miskella Infra-

Red Co., East 73rd and Grand Ave., Cleveland 4, Ohio. $5.00.

Handbook on color choosing, mixing, harmony, matching, lighting, photography, designation, pigments, testing, color in business. Patented color chart helps in selection of colors, mixing shades and tints, and harmonizing colors.

27-30. Infrared in Industry. William J. Miskella. 64 p., Miskella Infra-Red Co., East 73rd and Grand Ave., Cleveland 4, Ohio. $2.00.

A handbook on baking ovens for paints, textiles, chemicals, plastics, adhesives, written for the user, producer and salesman. Infrared in the spectrum; insulation; engineered appliances; infrared lamps; lamp spacing; how paints are baked; temperatures; advantages of infrared; portable frames; drying time table.

27-31. Concise Chemical and Technical Dictionary. Edited by H. Bennett. 1120 p. Chemical Publishing Co., Inc., 26 Court Street, Brooklyn 2, N. Y. $10.00.

50,000 definitions of terms used in science and industry. Trade names.

27-32. Bibliography on High-Frequency and Dielectric Induction Heating. 97 p., Aug. 1946. Northwestern Technological Institute Library, Evanston, Ill. 15c.

Classified and arranged alphabetically according to author in each section.

27-33. Protective and Decorative Coatings. Volume V. Joseph J. Mattiello, Editor. 662 p. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $7.00.

The following topics are dealt with in a thoroughgoing manner, each by one or more specialists in the respective fields: analysis of resins, analysis of drying oils, laboratory testing of metal finishes, spectral characteristics of pigments in the visual and infrared regions, and "resinography". Extensively referenced.

27-34. Mathematical Theory of Elasticity. I. S. Sokolnikoff and R. D. Specht. 373 p. McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. $4.50.

The first three chapters contain a comprehensive treatment of the theory of the mechanics of deformable media. Tensor notation is used. However, in the last two chapters, which treat extension, torsion, and flexure of homogeneous beams, and a development of variational methods, the scalar notation is used in discussing specific applications.

27-35. Foundry Process Control Procedures. 145 p. Society of Automotive *Engineers*, 29 West 39th St., New York 18, N. Y.

A compilation of reports made by the S.A.E. War Engineering Board covering steel castings, malleable iron castings, gray iron castings; and castings repair recommendations for steel, malleable iron, and gray iron.

27-36. German Technique in the Production of Light Alloys. P. M. Haenni and T. J. Peake. 22 p. Hobart Publishing Co., Washington, D. C.

Results of an investigation by a Canadian military team. Processes used from the ores to the finished products. Reprinted from PB 20633, Office of Technical Services, U. S. Dept. of Commerce, Washington.

27-37. Manual for Heat Treating Services. Metal Treating Institute, New York. $4.00.

Looseleaf book contains several sections which deal with such subjects as steel selection, machinability, grinding, relationship between heat treatment and design, basic principles of heat treating, a general description of the various heat treatments, nonferrous heat treating and brazing, cold treating, preparation and care of steel surfaces before, during, and after heat treating, inspection and testing, how to order heat treating, and a glossary of metallurgical terms.

27-38. Heat Exchanger Tube Manual. Edition 2. 169 p. Scovill Manufacturing Co., Waterbury, Conn.

Manual has been prepared primarily to serve as a guide in solution of problems involving condenser and heat exchanger tubes. It contains a large amount of information, mostly in tabular and chart form, on tube corrosion, tube installation, fluid flow and heat transfer, and properties of hydrocarbons and petroleum products.

27-39. Melting and Molding of Ferrous and Nonferrous Metals and Alloys. 157 p. U S. Navy Bureau of Ships, Washington 25, D. C.

Manual is intended for the use of Navy foundry personnel. Describes methods now in use at Navy Yards, at the Naval Research Laboratory, and by industrial foundries for the production of steel, cast iron, bronze, brass, and aluminum alloy castings.

27-40. Mechanical Inspection. H. F. Trewman. 162 p. Sir Isaac Pitman and Sons, Parker St., Kingsway, London, W. C. 2, Eng. 15s.

Essentials of mechanical engineering inspection; 126 illustrations showing practically all types of inspection equipment which would be used in the medium and light engineering industries. 27 tables of limits and dimensions for plain and screw-threaded work, the last chapter being confined to American measuring instruments.

27-41. Magnesium Fabrication. L. B. Harkins. 156 p. Pitman Publishing Co., 2 W. 45th St., New York, N. Y. $2.75.

Techniques of sheet-metal work in magnesium alloys. For light-metal workers and students.

27-42. Atlas of Defects in Castings, Series I, Cp. 34. Institute of British Foundrymen, Manchester, Eng. Associates 5s, nonmembers 10s, members gratis.

Intended to assist ferrous and nonferrous foundrymen in the correct recognition and classification of defects. Series of photographs of typical defects are reproduced with brief notes on the causes of the defects and suggested remedies. (From review in *Iron and Steel,* v. 20, Jan. 1947.)

27-43. Corrosion of Steels. 15 p. United States Steel Export Co., New York, N. Y.

The resistance of common commercial steels to corrosion. Information is general, rather than specific.

27-44. Transactions of the Electrochemical Society. Volume 88, 1946. 448 p. The Electrochemical Society, Inc., Columbia University, New York, N. Y.

32 papers presented at various symposiums during October 1945. Includes papers on electrodeposition of plastics; electro-organic reactions; electric furnace steel production; electrometallurgical processes; manufacture, fabrication, and properties of zirconium; studies of alloys of indium-tin, antimony-tin, and silver-tin; electrodeposition of metals on plastics; bright dipping; cleaning of metal surfaces; and miscellaneous electroplating papers

27-45. Engineering Radiography. Emmott & Co., Ltd., 31 King St., West, Manchester, Eng. 2s. 6d.

Underlying principles of radiographic inspection of engineering components; requirements and operation of X-ray apparatus. Stresses the need for the cooperation of the metallurgist and other interested parties until such time as the operator has become really expert in diagnosis. (From review in *Foundry Trade Journal,* v. 81, Jan. 2, 1947.)

27-46. Philips Resistance Welding Handbook. 210 p. Philips Industrial (Publications Dept.), Century House, Shaftesbury Ave., London, W. C. 2, Eng. 11s.

Companion volume to Philips Practical Welding Course, which deals with arc welding. Written to help those concerned in the actual carrying out of production jobs. (From review in *Foundry Trade Journal,* v. 81, Jan. 2, 1947.)

27-47. Metallurgical Experiments. F. Johnson. 78 p. Paul Elek, Ltd., Diamond House, 36-38 Hatton Garden, London, E. C. 1, Eng.

Laboratory manual gives directions for over 100 metallurgical experiments.

27-48. Metallic Testing and Heat Treatment. Leofric Fenn. 61 p. Scientific Publishing Co., Manchester, England. 5s.

A brief nontechnical description of test equipment and procedures; also heat treating procedures for steel.

27-49. Machine Design. Louis Jacquelin and Paul B. Eaton. Edition 5. 293 p. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $3.25.

New material on the fatigue of metals, modern ideas concerning the nature of friction and lubrication, and special precautions necessary in designing parts made from aluminum.

27-50. Oxidation of Metals at Elevated Temperatures. V. I. Archarov. 136 p., 1945. State Scientific-Technical Publishing House for Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R. (In Russian.)

A qualitative study of the phenomena involved in oxidation of metals, including a representation of the process on a microscopic scale; several fundamental conclusions. The approach is in contrast to the usual quantitative empirical method.

27-51. Alloys With High Coercive Characteristics. B. G. Livschitz. 122 p., 1945. State Scientific-Technical Publishing House for Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R. (In Russian.)

Review of present state of the knowledge; fundamental data on the influence of the individual components upon magnetic properties of the commonly used alloys. Results of a thorough investigation of the theory of heat treatment of such alloys in connection with the Fe-Al-Ni constitutional diagram, crystal structure, and metastable state. Production processes, application methods, test techniques.

27-52. The Wimet Tool Manual. 92 p. A. C. Wickman, Ltd., Coventry, England. 10s, 6p.

Handbook compiled by the three branches of this firm on the manufacture of sintered carbides. The various grades produced at present and their physical properties. Design of sintered carbide tipped tools. Brazing and grinding of tool tips.

27-53. Jig and Fixture Design. Volume I. A Suggested Unit Course in Jig and Fixture Design. 339 p. American Society of Tool Engineers, 1666 Penobscot Bldg., Detroit, Mich. $7.50.

Tool design principles and practices. Among topics discussed are: introduction to tool design; function of jigs and fixtures; jig and fixture design; how designs of jigs and fixtures are planned; tool drawing. Five complete units of instruction deal with the design of one or more types of jigs and fixtures.

27-54. Laboratory Manual in Metallography. John F. Eckel and Robert J. Randebaugh. 344 p. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $4.50.

Experiments to present the necessary techniques in metallurgy; the general fundamental principles involved in mechanical and thermal treatment of alloys; the common treatments of representative nonferrous alloys; and the common treatments of representative ferrous alloys.

27-55. Dictionary of Machine Shop Terms. Arthur C. Telford. 282 p. American Technical Society, Drexel Ave. at 58th St., Chicago, Ill. $.75.

Pocket size book of definitions, in the language of the trade, of thousands of terms used in machine shop and related activities.

27-56. Machine Design. Edition 5. L. J Bradford and P. B. Eaton. 86 p. Metallizing Engineering Co., Inc., Long Island, N. Y. $2.00.

Includes new material on the fatigue of metals, current theories on the nature of friction and lubrication, and special precautions necessary in designing parts made of aluminum.

27-57. Saws and Sawing Machinery. Eric N. Simons. 210 p., 1946. Sir Isaac Pitman & Sons, Ltd., Parker St., Kingsway, London, England. 15s.

Opening chapter outlines the function of saws and is mainly concerned with wood-cutting. Following chapters deal with handsaws, circular saws for wood and metal, inserted tooth and segmental saws, diamond-toothed saws, the hacksaw and bandsaws. Upkeep and maintenance of saws and various types of machines.

27-58. Steel Manufacture. Edwin Gregory and Eric N. Simons. 205 p., 1946. Sir Isaac Pitman & Sons, Ltd., Parker St., Kingsway, London, W.C.2, England.

Attempts to describe steel manufacture in a clear and concise manner, which the layman or student can readily understand. However, it is written mainly from the point of view of British industry.

27-59. Examination of Industrial Measurements. John W. Dudley, Jr. 113 p. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $2.00.

Simple and adaptable statistical techniques for detection of variation in industrial products. Important types of data which reveal causes of variation and effective methods for collecting, analyzing and presenting them. How to construct control charts, make quartile analyses, and analyze the limitations of curves made from industrial or engineering data.

27-60. A Bibliography on Die Casting. 1910-1946. 74 p. Technical Publishing Company, 1240 Ontario St., Cleveland, Ohio. $7.50.

Items are classified under nine headings, and arranged according to author in each section. Also contains a classified index to *Die Castings*.

27-61. The Design and Methods of Construction of Welded Steel Merchant Vessels. 164 p., July 1946. U. S. Government Printing Office, Washington 25, D. C.

Final report of a board of investigation appointed by the Secretary of Navy in April 1943. A short introductory section summarizes design, materials, construction, operating conditions, specific investigations, international exchange of information, findings, conclusions, opinions, and recommendations. The bulk of the information is in three "exhibits": Statistical Report of Structural Failures on Welded Steel Merchant Vessels (giving details of each case, including pictures of the damaged ships); Summary of Research Investigations; and Survey of Shipyard Welding Practices.

27-62. Copper Data. 72 p. Copper Development Association, London, England.

Selected information believed to be most valuable to the commercial user.

27-63. Mineral Dressing Notes. No. 15. 44 p. American Cyanamid Co., New York, N. Y.

A revision of the information presented in "Ore Dressing Notes—No. 7", published seven years ago. Characteristics and uses of the flotation reagents offered by Cyanamid. A brief description of flotation processes using the reagents mentioned, together with techniques of selective flotation of common base metal sulphide minerals and beneficiation of many nonmetallic ores. Average quantities of reagents fed to flotation circuits, method of feeding, points of addition, and minerals on which the various reagents are most effective presented in tabular form. 38 ref.

27-64. Manufacturing Processes. Edition 2. Myron L. Begeman. 635 p., 1947. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $5.00.

Brought up to date throughout in regard to newly designed machines and tools. New chapters have been added on special casting methods, powder metallurgy, hot forming of metals and cold forming of metals; the chapter on plastic molding has been rewritten, and much of the material on welding and allied processes.

27-65. Welding Symbols. 115 p. The Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis. $2.50.

Standards and symbols are those recognized by the American Welding Society, including those for arc and gas welding as well as resistance.

27-66. **Finishes for Aluminum. (In Two Parts.)** 228 p. Reynolds Metals Co., 2500 So. Third St., Louisville 1, Ky. $2.00.

Cleaning treatments; mechanical surface finishes; chemical surface finishes; electrolytic oxide treatments; electroplated coatings; paint application methods; paint coatings; ceramic coatings; special finishes such as silk screen and sprayed metal finishes. Shop data on materials, equipment, solution preparation and procedure.

27-67. **A Treatise on Milling and Milling Machines. Section 2.** 326 p. The Cincinnati Milling Machine Co., Marburg & Klein St., Cincinnati, Ohio. $1.00.

Fundamental concepts of milling, including cutting speed, feed per tooth, amount of work material removed, chip formation, surface finish, cutting fluids.

27-68. **Proceedings of the Second Industrial Waste Conference.** 183 p. Jan. 10-11, 1946. Department of Engineering Extension, Purdue University, Lafayette, Indiana. (Extension Series No. 60.) Gratis.

A series of papers and discussions on waste disposal and utilization. Types of wastes discussed included: food wastes, waste pickling liquors, brewery wastes, metal-plating wastes, oil-refinery wastes, paper-manufacturing wastes, sewage, and miscellaneous industrial wastes.

27-69. **Chemical Crystallography.** C. W. Bunn. 422 p. Oxford University Press, Oxford, England. $7.50.

Methods which have been developed for identification of solid substances by microscopic or X-ray methods and for determination of precise atomic positions in crystals. No previous knowledge of crystallography is assumed. An account of the elements of crystal morphology and optics, the interpretation of various types of X-ray diffraction photographs, and the location of atoms both by the trial-and-error method and by Fourier-series methods.

27-70. **Aluminum Surface Finishes.** 80 p. Aluminum Co. of Canada, Ltd., Montreal, Canada. Gratis.

Practical information about the various chemical, electrochemical, and mechanical finishing techniques. The use of paints, enamels, lacquers, and varnishes.

27-71. **Carborundum Grinding Bulletins.** 108 p. Carborundum Co., Ltd., Trafford Park, Manchester, England.

The Carborundum Co. has issued in bound form 25 different bulletins which have been published since 1942, and which give instructive information on the economical use of abrasives in industry. This contains a vast amount of information which can be usefully applied in the workshop with such items as wheel balancing, truing grinding wheels with diamond tools and nondiamond tools, and similar subjects. Owing to the extremely short supply, the distribution of these bulletins is limited to bona fide technical establishments, training colleges, and the like. (From review in *Industrial Diamond Review*, v. 7, March 1947.)

27-72. **Cutting Tools for Engineers. Revised Edition.** A. H. Sandy. 130 p. Crosby, Lockwood and Son, Ltd., London, England. 5s.

General considerations, the mechanics of metal cutting, and tool materials. Modern practice as applied to hand tools, drills, lathe tools, milling cutters, broaches, and gear-cutting tools. Tool and cutter grinding, and cutting lubricants.

27-73. **A.S.T.M. Specifications for Steel Piping Materials.** 307 p. Dec. 1946. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. $3.00.

Requirements of materials such as castings, forgings, bolting materials, and nuts used in piping installations; specifications for steel piping materials. Standards are given for valve, flange, and fitting castings, and also for carbon and alloy steel bolting. Specifications for forgings and welded fittings are included.

27-74. **Light Metals Monopoly.** C. F. Muller. 279 p. Columbia University Press, 2960 Broadway, New York 27, N. Y. $3.00.

Based on two antitrust cases in aluminum (1937-1945) and magnesium (1941-1942), an economic study of the position held by the Aluminum Co. of America shows how important monopolies have developed and describes their effect on the production and development of light metals. Three factors are emphasized: control of power sources; international cartel relations; and control of a substitute, magnesium. The relation of government policy to monopolies is examined, and alternatives are suggested to cope with the basic economic problem. (From review in *Electrical Engineering*, v. 66, April 1947.)

27-75. **The Problem of Fracture.** John H. Hollomon. 92 p. American Welding Society, 33 West 39th Street, New York 18, N. Y. $1.00.

This monograph is the result of a survey of available information sponsored by the Welding Research Council of the American Welding Society. The author has attempted to interpret the knowledge of fracture in

terms of consistent theory. Where there are divergencies in knowledge, they are pointed out, and where theory is inadequate, an attempt is made to indicate the direction of research to resolve the difficulty. The analysis does not necessarily represent the accepted interpretation of fracture, but is often a reflection of the author's point of view. 126 ref.

27-76. Metallizing Nonconductors. S. Wein. 62 p. Metal Industry Publishing Co., 11 W. 42nd St., New York, N. Y. $2.00.

Methods of metallizing, or deposition by plating, of metals on nonconductors. A historical review of the subject and extensive patent listings. Formulas and procedures.

27-77. Transactions of the American Foundrymen's Association. 421 p. American Foundrymen's Association, 222 West Adams St., Chicago 6, Ill. $4.00 to members and $15.00 to nonmembers.

Sixty-five papers prepared for presentation at the 1945 annual convention of the American Foundrymen's Assoc. Papers cover a wide range of topics relating to the various branches of the foundry industry and deal with sand, radiography, patterns, welding, wage incentives, precision casting, matchplates, refractories, safety and hygiene, melting, reduction of microporosity in magnesium castings.

27-78. Specifications and Tests for Electrodeposited Metallic Coatings. 46 p. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. $1.25.

Compilation of standard specifications and tests for electrodeposited metallic coatings issued under the joint sponsorship of the A.S.T.M. and the American Electroplaters' Society.

27-79. Resistance Welding Manual. Revised Edition. 552 p. Resistance Welder Manufacturers' Assoc., 505 Arch St., Philadelphia, Pa. $3.00.

Contains 20 entirely new chapters, as well as revisions of previously published chapters. Each group of metals is treated in a separate chapter. Mechanical and electrical characteristics of both a.c. and stored energy systems are treated in detail. New section contains chapters on quality control, standard tests, and instrumentation. Results of important research studies are presented in abstract form in appropriate sections.

27-80. Acid Electric Furnace Steelmaking Practice. Conrad C. Wissmann. 84 p. 1947. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $1.00.

This booklet presents a simple set of instructions primarily as an aid to those who are engaged in the operation of acid electric steel-melting furnaces. Confined to operating problems.

27-81. The Iron Age Welding Manual. Edition 1. 172 p. Iron Age, 100 East 42nd St. New York, N. Y.

Many tables, diagrams, and illustrations. However, the bulk of the material is in the form of chapters on different aspects of welding by experts in the respective fields. These are arranged in four sections: arc, resistance, gas, and pressure welding.

27-82. 10,000 Trade Names. Edition 1. T. W. Lippert. 112 p. Iron Age, 100 East 42nd St., New York, N. Y. Reprinted from *Iron Age,* Jan. 2 through March 6, 1947, issues.

Alphabetical index of all American and foreign ferrous and nonferrous metals and alloys, plastics, nonmetals, refractories, cements, lubricants, chemicals, plywoods, machine tools, small tools, rolling mills, cranes, bearings, joining devices and other equipment made and used by the metals industry; processes, proprietary and otherwise, in the production, shaping, treating and finishing of metals. Each item is described briefly, and the manufacturer's name and address are given.

27-83. Symposium on Testing of Bearings. 72 p. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. $1.50.

Five technical papers presented at the 49th Annual Meeting of the American Society for Testing Materials at Buffalo, June 24-28, 1946. They include life testing of plain bearings for automotive engines, fatigue testing machines for ball and roller bearings, metallographic observation of ball-bearing fatigue phenomena, and testing of bearings under controlled loads.

27-84. The Development of Monolithic Dolomite Linings. 253 p. 1946. The Iron and Steel Institute, 43 Grosvenor Gardens, London, S.W.1, England. (Special Report No. 33.)

Six sections by different authors give details of the results of cooperative wartime research in Britain. Results of a fundamental study of dolomite and its fabrication into dolomite refractories and furnace lining materials; use of tar as a bonding material; work on the development of satisfactory technique for lining and maintenance of different types of furnaces; and results of experiences with commercial electric furnaces, openhearths and bessemer converters, lined with dolomite.

27-85. First Report of the Rolling Mill Research Subcommittee of The Iron and Steel Industrial Research Council. 146 p. 1946. The Iron and Steel Institute, 4 Grosvenor Gardens, London, S.W.1, England. (Special Report No. 34.)

Extensive report consists of five sections by different authors: an intro-

duction; a critical literature survey (184 ref.); a detailed illustrated description of an experimental cold rolling mill recently rebuilt at Sheffield University; a description of an improved instrument developed for measuring roll force, including a discussion of previously used methods; and a description of a simple method for calculating roll pressure and power consumption in hot flat rolling.

27-86. Second Report on the Development of Monolithic Dolomite Linings. 140 p. 1946 The Iron and Steel Institute, 4 Grosvenor Gardens, London, S.W.1, England. (Special Report No. 35.)

Another extensive report on dolomite linings. Subjects investigated in separate papers by different authors include: properties of fettling materials; tar-bonding; correlation of panmill data; fettling of openhearth furnaces; factors affecting hearth life; dolomite doors and wing walls; taphole construction and maintenance; factors affecting consumption of dolomite in openhearth furnaces; utilization of dolomite in electric furnaces, bessemer converters, and mixer ladles.

27-87. Wear of Metals. D. Landau. 85 p. Nitralloy Corp., New York, N. Y.

The second edition of a useful brochure on wear. 66 ref.

27-88. Carboloy Die Service Manual. 64 p. Carboloy Co. Inc., Detroit, Mich.

Service manual on the necessary maintenance operations for small and large dies, as well as special shaped dies. Great emphasis is laid on the correct die shape, and nomographs are appended for their determination. Several grades of diamond powder are referred to, but no data on the grain size is given. Shaped and rough diamond tools for the blending of radii and boring the die channel are mentioned. An illustrated list of necessary machines and special tools is given, as well as the layout of an up-to-date die maintenance plant.

27-89. Roentgenographisch-Analytische Chemie. (X-Ray and Analytical Chemistry.) E. Brandenberger. 287 p. Verlag Birkhaeuser, Basel, Switzerland.

Differs from other publications in that it does not show how the tests are actually performed but only demonstrates what problems in chemical investigation can be solved by means of X-ray analysis. It also shows what answer can be expected in a specific case and the assumptions for application of this technique. A minimum of mathematics is used and frequent use is made of diagrams and lattice schemes. References to the literature are given following each paragraph.

27-90. Spanabhebende Metallbearbeitung. (Metalworking by Chip Producing Methods.) A. Michalik and L. Eberman. 222 p. 1944. Schweizer Druck- und Verlagshaus, Zurich, Switzerland.

A good introduction to the field of metalworking for apprentices and young technicians.

27-91. Bibliography of the Platinum Metals. 1918-1930. James Lewis Howe and others. 138 p. Baker & Co., Inc., Newark, N. J. $5.00.

References are arranged alphabetically according to author for each year. Some of them include brief annotations. There is a subject index.

27-92. Stress-Corrosion Cracking of Mild Steel. James T. Waber and Hugh J. McDonald. 94 p. Corrosion Publishing Co., 1131 Wolfendale St., Pittsburgh, Pa.

A series of seven extensively referenced articles recently published in *Corrosion and Material Protection*, a collection of contributed criticisms, and the authors' replies. A general "precipitation" theory of stress corrosion is developed which states that high local stresses induced by the presence of a crack accelerate the formation of a galvanic cell, by accelerating precipitation, and the crack grows by the dissolution of newly formed anodic material.

27-93. The Rare-Earth Elements and Their Compounds. Don M. Yost, Horace Russell, Jr., and Clifford S. Garner. 92 p John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $2.50.

The principal chemical and physical properties of the rare-earth elements and their compounds; the agreement of current theories with these properties. Chemical properties, methods of separation, preparation, reactions, and solubilities. Frequent references to the literature. It is assumed that the reader or student is thoroughly familiar with modern physical chemistry and physics.

27-94. Proceedings of the American Electroplaters' Society, 33rd Annual Technical Sessions, Pittsburgh, Pa., June 1946. 304 p. American Electroplaters' Society, Jenkintown, Pa. $6.50.

Contains technical papers, discussion, and remarks. Individual papers have all been annotated in Sections 7 and 8 of the Review of Metal Literature. Those papers that were preprinted or previously published in other sources were listed at the time of first publication. All papers not prepublished in such manner are listed in the Review of Metal Literature at time of publication of the bound volume of the *Proceedings*.

27-95. Novena Memoria Anual. (Annual Report of the "Banco Minero" of Bolivia for 1945.) 35 p. Banco Minero de Bolivia, La Paz, Bolivia.

Survey of prices and export of min-

erals and metals produced in the Republic of Bolivia during the year 1945; namely, tin, antimony, tungsten, lead, silver, gold, and asbestos.

27-96. L'Aluminium dans les Réseaux de Distribution a Moyenne et Basse Tension. (Aluminum in Medium and Low-Tension Electric-Current Distribution Networks.) 138 p. L'Aluminium Francais, 23 bis, Rue Balzac, Paris, France.

Increasing utilization of aluminum for the above in France since 1930. The various types of aluminum-containing conductors and their applications. Their properties are compared with those of copper conductors and instructions are given for their installation.

27-97. Technology of Refractories. V. I. Perevalov. 528 p. State Scientific-Technical Publishing Home for Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R. (In Russian.)

College text analyzes properties of the raw materials used by the refractory industry, modern commercial production methods and equipment, and the fundamental principles of the reactions taking place during the manufacture of refractories.

27-98. Engineering Problems Manual. Edition 4. Forest C. Dana and Lawrence R. Hillyard. 432 p. McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. $3.25.

The revisions are based upon war-inspired experiments.

27-99. Steel Expansion for War. W. A. Hauck. 192 p. *Steel*, Book Department, Penton Building, Cleveland 13, Ohio. $2.00.

Official and authentic report on expansion of the steel industry for the 5½ years from Jan. 1, 1940 to June 30, 1945. The added capacity and cost of every steelmaking facility built during the war. List of companies making every type of finished steel product, plus latest data on new mills now being constructed. Information on new and revamped facilities of hundreds of plants, including those in ore, ore transportation, coal and coke, refractory, ferro-alloy, scrap, foundry, and forging industries. Illustrated and contains numerous charts and tables.

27-100. The Coloring of Metals. Parts I and II. 148 p. Hood Pearson Publications, Ltd., London, England. 3s 6d.

Technical guidance handbook is the first of a series being published for the use of those engaged principally in the metallurgical and allied fields. Part I refers to the more practical aspects of coloring steel, iron, copper, brass, white metals, zinc, and die castings, whereas Part II contains details of laboratory experimental work, and discusses mainly various blackening processes and the multicoloring of anodized aluminum. The review criticizes the manner of presentation, the lack of references, and the lack of colored plates, in view of the subject. (From review in *Industrial Chemist*, v. 23, March 1947.)

27-101. Metallurgy. A Scientific Career in Industry. 36 p. Fanfare Press, London, England.

Booklet designed to point out the advantages of a metallurgical career to the science student who usually hears more about possibilities in basic fields such as chemistry and physics. British point of view makes it of doubtful value for vocational guidance in this country.

27-102. Accident Prevention Manual for Industrial Operations. 544 p. National Safety Council, 20 N. Wacker Dr., Chicago, Ill.

Prepared primarily for the manufacturing industries. Fourteen major subjects covered in the manual are as follows: plant design and layout; construction and demolition; permanent handling and storage; electrical hazards; chemical hazards; fire and explosion hazards; flammable liquids; hand and portable power tools; commercial vehicle operation; personal protective equipment; industrial hygiene; and safety organizations and programs. (From review in *Modern Machine Shop*, v. 19, May 1947.)

27-103. The Steel and Steel-Using Industries of California. E. T. Grether. 408 p. California State Reconstruction and Reemployment Commission, Printing Division, Documents Section, 11th and O Streets, Sacramento 14, Calif.

Results of an extensive survey. However, they are considered to be tentative and exploratory, since the steel-using industries were sampled rather than investigated in their entirety.

27-104. Radiography in Modern Industry. 122 p., illus. Eastman Kodak Co., X-Ray Division, Rochester 4, N. Y. $3.00.

A fundamental text on radiographic practice, well illustrated by photographs, diagrams and charts. Bibliography and index included.

27-105. Mechanics of Materials. Edition 2. Philip Gustave Laurson and William Junkin Cox. 422 p. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $4.00.

In this new edition of a textbook first published in 1938, a chapter on columns with axial loads replaces the former one on column theory, and a chapter on columns with eccentric loads replaces the one on design of columns. Mohr's circle is added to the discussion of combined stresses. There are 640 problems. Tables appended are sufficient for solution of all prob-

lems in the text. (From review in *Aeronautical Engineering Review*, v. 6, April 1947.)

27-106. Resistance of Materials. Edition 3. Fred B. Seely. 486 p. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $4.00.

Engineering problems in general; emphasis on any particular field is avoided. Developments in use of light metals and high-strength metals such as alloy steels. Welded connections.

27-107. A Century of Silver. Earl Chapin May. 400 p. Robt. M. McBride & Co., 200 East 37th St., New York 16, N. Y. $3.50.

The evolution of silverware in mass production from early plated products made at home by crude processes, through britannia ware and finally into plated and sterling ware produced by modern methods. This story of silver is set against the background of the rise and development of the International Silver Co.

27-108. Brass Pressings and Other Copper Alloy Products. 72 p. Copper Development Association, Grand Buildings, Trafalgar Square, London, W.C. 2, England.

A general description of the principal processes employed in the manufacture of copper alloy strip and sheet products and the mechanical properties and chemical compositions of the commercial copper alloys, brasses, and bronzes.

27-109. Essays on Rheology. 103 p. Sir Isaac Pitman and Sons, Ltd., Parker St., Kingsway, London, W.C. 2, England. 12s, 6d, net.

The rheology of metals, polymers, and liquids. The rheology of polymers and liquids. The plasticity of metals. The relationship between compression and shear tests. The time-variations of stress and strain. Rheological nomenclature and symbols. The applications of rheology to medical science. Rheology and naval problems. Rheology in the fine arts.

27-110. Casting Alcoa Alloys. 140 p. Aluminum Co. of America, 2140 Gulf Bldg., Pittsburgh, Pa.

Properties and applications of the various aluminum-ingot products and casting alloys made by Alcoa. Recommended foundry practices and heat treatment procedures.

27-111. Proceedings of the Twenty-Ninth Conference—National Open Hearth Committee of the Iron and Steel Division. Volume 29. 341 p. 1946. National Open Hearth Committee, Iron and Steel Division, A.I.M.E., 29 West 39th Street, New York, N. Y.

Technical papers and discussion at basic and acid-openhearth sessions of Chicago meeting, April 24-26, 1946.

27-112. Year Book of the American Bureau of Metal Statistics. Twenty-Sixth Annual Issue. 112 p. American Bureau of Metal Statistics, 33 Rector St., New York, N. Y.

An annual statistical compilation covering production, consumption, prices, imports, and exports, not only for U. S. but for the rest of the world as well. Divided into the following main sections: copper, lead, zinc, gold and silver, and miscellaneous.

27-113. Symposium on the Hardenability of Steel. 430 p. Iron and Steel Institute, 4 Grosvenor Gardens, London, England. (Special Report No. 36.)

The Hardenability Sub-Committee of the British Iron and Steel Institute was formed following a visit of British metallurgists to the U. S. in 1943 to discuss the conservation of critical alloys in steel production. The purposes of the committee were: to standardize the conditions of carrying out the end-quench (Jominy) hardenability test, examine the effect of deviation from the standard conditions, and adopt a standard method of reporting the data; to examine the fundamental principles governing the test and recommend the best methods of interpreting the results; and to survey a representative set of steels by hardenability tests and correlate the results with mechanical properties. Details of the resulting extensive investigation, the results obtained and suggestions for future research. A bibliography of 255 references covers the years 1938 through 1944.

27-114. 60 Years With Men and Machines. Fred H. Colvin. 300 p. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. $3.50.

This book was written by a man who has spent some 63 years in or connected with the metal-manufacturing industry. It is an absorbing, and sometimes highly amusing, account of the world of invention, machinery, and production from 1884 to the present day. (From review in *Modern Machine Shop*, v. 20, June 1947.)

27-115. Strategic Minerals. John B. DeMille. 626 p. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $7.50.

Detailed information on the essential chemical and physical properties of 76 strategic metals and minerals. Sources of these materials, and pertinent statistics on the domestic and foreign output and distribution of each. The development of new applications for these minerals in industry, and new methods in metallurgy. Brief review of government regulations affecting procurement and production, and a detailed discussion of stockpile directives.

27-116. Running a Machine Shop. Edition 2. Fred H. Colvin and Frank A. Stanley. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $4.00.

Advances, new methods, standards, use of color, color codes in the shop, machining of Dowmetal and magnesium, glass-reinforced plastics, windowless shops, and use of broaching instead of milling in the making of rifle parts.

27-117. The Blueprint Language. Henry Cecil Spencer and Hiram E. Grant. 255 p. Macmillan Co., 60 Fifth Ave., New York 11, N. Y. $5.00.

Emphasizes visualization of views of objects. Work sheets at the end of each chapter provide the student with training in making mechanical drawings. The last chapter includes a large number of commercial blueprints, carefully selected to bring out a variety of principles and practices. A chapter on shop processes is provided for those whose experience may be limited. This chapter explains briefly the forming of metals, forging, and casting, as well as basic machine-tool operations. (From review in *Machinery,* v. 53, July 1947.)

27-118. Control Charts in Factory Management. William B. Rice. John Wiley and Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $2.50.

After a few introductory chapters on statistical control and the role of inspection, the main substance is contained in three chapters. The first deals with charts for variables in which quality is described quantitatively in terms of dimensions, weights, or other characteristics. The second deals with charts for attributes, in which inspection is visual or by "go and no-go" gages. Then follows a chapter giving a number of illustrative case histories. Finally, there is a chapter on the organization of a statistical quality-control program.

27-119. Ferrous Metallurgical Design. John H. Hollomon and Leonard D. Jaffe. 346 p. 1947. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $5.00.

This book is not devoted to design of parts or structures, or to stress analysis, but rather to the application of scientific principles to the selection of metals and alloys for specific applications, and also to the selection of heat treating procedures to develop the required properties. In order to do this it is necessary to have a knowledge of phase transformations, heat flow, mechanical properties, quenching and quench cracking, hardenability, and temperability. These topics are covered in separate chapters, followed by two chapters on their application to design. 317 ref.

27-120. Stainless and Heat Resisting Steels—Simply Explained. Edwin Gregory and Eric N. Simons. Hutchinson's Scientific and Technical Publications, Ltd., 47 Princes Gate, London, S.W. 7, England. 8s, 6d.

Deals with a wide range of stainless and heat resisting steels. A simple explanation of the mechanism of corrosion, erosion, and creep, followed by the commercial methods of manufacture of the stainless steels. The next section covers the various steels and irons themselves; how to handle these steels in many different ways. Stainless-clad materials and stainless steel castings. Notes on testing, inspection, applications, useful charts, tables, and diagrams.

27-121. Aluminum Alloy Castings—Their Founding and Finishing. E. Carrington. Charles Griffin & Co., Ltd., 42 Drury Lane, London, W.C.2, England. 25s.

Elementary text is kept at the level of the "practical" man. Cost estimation; die making; sand control; molding; sand casting; heat treatment.

27-122. Quin's Metal Handbook and Statistics, 1946. F. B. Rice-Oxley, compiler. 424 p. Metal Information Bureau, Ltd., Princes House, 39 Jermyn St., London, S.W.1, England. 12s, 6d, post free.

33rd edition of this reference work incorporates a great deal of information that was not available, for security reasons, during the war years. Details of United Kingdom imports and exports for the years 1940-44 are given, together with statistics on British iron and steel and ferro-alloy production. A new feature is a summary of the white paper on the British Iron and Steel Federation's report on plans for the modernization of the British iron and steel industry. (From review in *Mining Magazine,* v. 76, June 1947.)

27-123. The Welding Encyclopedia. 12th Edition. T. B. Jefferson. 1024 p. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $6.50.

An up-to-date treatment of every subject which deals with welding, cutting or related processes. In this edition 300 pages of material of the previous edition are replaced to take care of advances made in welding during the war. The book contains five sections, the first of which is an encyclopedia of welding. This is followed by an appendix containing tables and charts, a dictionary of trade names, a buyers' manual, and an index with cross references. (From review in *Iron Age,* v. 159, June 19, 1947.)

27-124. Applied Engineering Mechanics. Alfred Jensen. 316 p. McGraw-Hill

Book Co., Inc., 330 W. 42nd St., New York, N. Y. $3.00.

Text is suitable for college students in engineering and architecture and for those in junior colleges and technical institutes. The first part is devoted to statics and the second to dynamics. To aid the student, the more abstract mathematical relationships have been minimized in favor of strong emphasis on the physical concepts. Problems are given more than usual emphasis. Analytical and graphical solutions are given side by side. (From a review in *Power,* v. 91, June 1947.)

27-125. Materials of Industry. Fourth Edition. Samuel Foster Mersereau. Revised by Calvin G. Reen and Kenneth L. Holderman. 632 p. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. $2.80.

Industrial materials widely used today, such as petroleum, concrete, glass, alloy steels, magnesium, synthetic rubber, and plastics.

27-126. Servomechanism Fundamentals. H. Lauer, R. Lesnick, and L. E. Matson. 277 p. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $3.50.

Detailed derivations are made of the basic properties of servocontrol devices and their relation to the physical principles that govern their operation. Several examples, exercises, and problems of a practical nature are given, together with formulas, curves and diagrams needed for their solution. (From review in *Power*, v. 9, June 1947.)

27-127. Theory of Metallurgical Processes. S. T. Rostovtsev. 307 p. State Scientific Publishing House for Ferrous and Nonferrous Metallurgy, Moscow, Russia. (In Russian.)

Emphasizes the thermodynamic investigation of metallurgical reactions. Since the investigation of the kinetics of metallurgical processes is in its initial stages, the author introduces his own theories and methods of solution for a series of problems on some of the simpler metallurgical processes, including the application of physical chemistry to metallurgical processes, combustion theory, the system iron-oxygen, slag properties and systems, reduction theory, oxidation smelting, and desulphurization and dephosphorization of metals.

27-128. Practical Mechanics for All. Leroy E. Beaufoy, Editor. 448 p. Odhams Press Ltd., Long Acre, London, England. 9s, 6d.

Consists of fourteen chapters each written by a separate authority on the mechanics of equilibrium; forces in structures; the mechanics of movement; friction and lubrication; practical mechanisms; forms of energy; strength of materials; properties of materials; machine principles and design; mechanics of fluids; hydraulic machinery; testing and driving machines; mechanics of flight. (From review in *Machinery (London),* v. 70, May 8, 1947.)

27-129. Standard Specifications for Welding Highway and Railway Bridges—Design, Construction and Repair. Fourth Edition. 102 p. American Welding Society, 33 W. Thirty-Ninth St., New York 18, N. Y. $1.00.

An extended discussion of a new concept in design formulas. In this concept the formulas are prescribed for both base material and welded connections according to the expected number of repetitions of loading which would produce the maximum stress in a member. The section on material has been revised to provide for more general use of A7 steel, and the section on inspection has been expanded to include provision for magnetic-particle testing, as well as X-ray and visual examination. (From review in *Railway Age,* v. 123, July 19, 1947.)

27-130. X-Rays in Research and Industry. Second Edition. H. Hirst. 124 p. Chapman & Hall, Ltd., 37 Essex Street, W.C.2, London. 13s, 6d.

Based on a series of lectures, this book deals with X-ray technique in a concise and practical way. Problems in industry and research, particularly in metallurgy, receive special attention.

27-131. Report on Boron-Treated Steel. 72 p. Society of Automotive Engineers, Inc., 29 W. 39th St., New York, N. Y. $2.00.

Summarizes the contents of 19 reports submitted by 12 collaborators who participated in the testing program conducted during the war for the U. S. Army's Ordnance Dept. The program was designed to determine the following: the relative merits of 7 commercial boron-containing addition agents when added in varying amounts to a 0.45 to 1.50% Mn steel. The suitability of a boron-treated 0.45 to 1.50% Mn steel for an army truck part, and for other parts of ordnance equipment was determined by special laboratory and shop tests.

27-132. Review of Metal Literature, 1946. Volume 3. 811 p. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $15.00.

A compilation of the annotations published in *Metals Review* during 1946. Also includes a list of addresses of publications, an author index, and a subject index. Contains 5500 annotations and lists 275 English-language and 18 foreign-language periodicals as

sources (other than books and miscellaneous publications).

27-133. The Structure of Cast Iron. Alfred Boyles. 154 p. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $3.25.

A series of three lectures on the structure of cast iron presented during the 28th National Metal Congress and Exposition, Atlantic City, Nov. 18 to 22, 1946. The lectures are limited to the structure of cast iron as determined by freezing and transformation. Intended for metallurgists familiar with steel, but not with cast iron. Attention is centered on alloys of hypoeutectic composition, and special alloying elements are excluded. Most of the experimental work described was done at Battelle Memorial Institute.

27-134. Ball and Roller Bearing Engineering. Arvid Palmgren. 270 p. S. H. Burbank & Co., 147 N. Tenth St., Philadelphia, Pa.

This is a fundamental text; it is neither a comprehensive treatise nor a bearing catalog. Emphasis is placed on fundamental principles rather than on specific problems. Derivations and calculations which require a knowledge of higher mathematics have been omitted wherever possible. (From review in *Automotive and Aviation Industries*, v. 96, June 1, 1947.)

27-135. Metallische Ueberzuege (Metallic Coatings). Second Edition. Willi Machu. 643 p. Becker & Erler Kom.-Ges., Leipzig, Germany. Reprinted by Edwards Brothers, Inc., Ann Arbor, Michigan. $15.50.

A section on corrosion, preparation of metallic objects for metal coating, manufacture of metal coatings by heat, mechanical and electrochemical processes. Each type of metallic coating is discussed in detail in the second section. (From review in *Aeronautical Engineering Review*, v. 6, April 1947.)

27-136. Symposium on Testing of Parts and Assemblies. 86 p. June 26, 1946. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. (Technical Publication No. 72.) $1.50.

The fatigue strength of lap joints in some magnesium sheet alloys, by H. J. Grover and L. R. Jackson. Automotive rear axles and means of improving their fatigue resistance, by O. J. Horger and C. H. Lipson, and accompanying discussion.

27-137. Protective Organic Coatings as Engineering Materials. Joseph J. Mattiello. 100 p. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Raw materials, the various types of coatings, fundamental investigations, corrosion theory, surface preparation, applications (the largest section), testing, economics, and future trends. (Reprinted from *Proceedings of the American Society for Testing Materials*, v. 46, 1946.)

27-138. Grinding Wheels. 94 p. Mid-West Abrasive Co., Owosso, Michigan.

Various points of grinding wheel usage. Grinding wheel bond, structure, grade and grain size, recommended specifications in connection with the new standard wheel marking symbols. Notes on crush truing grinding wheels, centerless grinding of screw threads, and microbonded honing stones.

27-139. Illinois Mineral Industry in 1945. Walter H. Voskuil, Douglas F. Stevens and Nina T. Hamrick. 116 p. Illinois State Geological Survey, Urbana, Ill. (Report of Investigations No. 121.)

Statistics on coal, petroleum and gas, stone and rock products, clay and clay products, sand and gravel, silica and tripoli, fluorspar, zinc, lead, silver, miscellaneous minerals, and minerals processed but not mined in Illinois.

27-140. The Flotation Index. Volumes I and II. 88 p. Great Western Division, Dow Chemical Co., 310 Sansome St., San Francisco, Calif.

Volume I is a bibliography of articles, papers, reports, and books on the subject of flotation from 1928 through 1944, and volume II lists articles published in late 1944 and 1945. Includes patents, but no abstracts. Arrangement is by source, and there is no index.

27-141. Tungsten. K. C. Li and Chung Yu Wang. 430 p. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y. $8.50.

This edition has been revised by addition of more recent material, particularly to the chapters on geology and industrial applications. Its history, geology, ore-dressing, metallurgy, chemistry, analysis, applications, and economics. Procedures for purchase of tungsten ores and a bibliography of articles on tungsten alloys.

27-142. Aircraft Strength of Materials. H. D. Conway. 256 p. Chapman and Hall, 37 Essex St., London, W.C.2, England. 21s.

A rapid survey of basic structural theory and a number of problems of particular interest to the aeronautical engineer.

27-143. Spring Design and Calculations. J A. Roberts, compiler. Technical Research Laboratory. Herbert Terry and Sons. Ltd., Redditch, England. 10s, 6d.

The practical aspects of designing a spring to do its job efficiently.

27-144. Torsionssteifigkeit im Flugzeugbau verwendeter Systeme. (Torsional Stiffness of Wings.) Ilhan Nural. A. G.

Gebr. Leeman & Co., Zurich, Switzerland.

An analysis of the behavior in torsion of a box system designed to represent an airplane wing structure, together with an account of some interesting related experiments.

27-145. **British Standards for Workshop Practice. Revised Edition.** J. E. Baty, editor. 483 p. British Standards Institution, 28 Victoria St., London, S.W.1, England. 12s, 6d to nonmembers.

Essential data and drawings relating to forty British Standards covering limits and fits; threads, nuts, bolts, screws and washers; small rivets; certain small tools; drilling-jig bushes; butt welded lathe and planer tools; keys and keyways; shaft tapers, splines and serrations; ball and roller bearings; and certain details of machine tools. Also includes data on cast iron and steel, wire gages and metric conversions.

27-146. **Mathematical Methods of Statistics.** Harald Cramer. 575 p. Princeton University Press, Princeton, N. J. $6.00.

An introduction to the fundamental concept of a distribution and of integration with respect to a distribution. The general theory of random variables and probability distributions, and the theory of sampling, statistical estimation, and tests of significance.

27-147. **Surface Stressing of Metals.** 197 p. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $4.00.

A series of five lectures on effect of surface stressing of metals on endurance under repeated loadings, presented during the National Metal Congress and Exposition, Cleveland, Feb. 4 to 8, 1946. The problem defined, by H. F. Moore. Measurement of surface stresses, by W. M. Murray. Fatigue of metals as influenced by design and internal stresses, by J. O. Almen. Stressing axles and other railroad equipment by cold rolling, by O. J. Horger. Progressive stress-damage, by Peter R. Kosting.

27-148. **Powder Metallurgy.** Henry H. Hausner. 307 p. Chemical Publishing Co., Inc., 26 Court St., Dept. M. C., Brooklyn 2, N. Y. $7.00.

The principles of powder metallurgy. Methods of manufacture, commercially available metal powders, and their applications. The relationship between physical properties of the metal compact. A complete glossary of powder metallurgical terms and an annotated bibliography of 1064 references.

27-149. **Manual of Foundry and Pattern Shop Practice.** Otis J. Benedict, Jr. 361 p. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $3.25.

The fundamental processes of pattern design and construction, molding, cupola operation, pouring, cleaning, and inspection of castings. Pattern design and construction. A list of visual aids—motion pictures and film strips.

27-150. **Mathematical Methods in Engineering.** Theodore V. Karman. 505 p. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $4.50.

This book should be of great use to the general designer. It requires only knowledge of algebra, analytical geometry, and basic calculus and, building upon them, clearly illustrates the methods of handling such problems as vibration, structures and dynamics. (From review in *Machine Design*, v. 19, July 1947, p. 155.)

27-151. **Handbook of Structural Design in the Aluminum Alloys.** J. E. Temple. 147 p. James Booth and Co., Ltd., Argyle Street Works, Nechells, Birmingham 7, England. 21s.

Written for engineers already experienced in the design of steel structures; stress is on differences between the use of aluminum alloys and steel.

27-152. **Metal Statistics, 1947. Fortieth Annual Edition.** 816 p. American Metal Market, 18 Cliff St., New York, N. Y. $2.00.

An annual volume of price and production statistics. Most prices are based on quotations published in *American Metal Market.*

27-153. **Structural Analysis.** W. Fisher Cassie. 260 p. Longmans, Green and Co., 55 Fifth Ave., New York 3, N. Y. 16s.

Assumes an understanding of the theory of statically indeterminate structures and concentrates on numerical problems.

27-154. **S.A.E. Handbook, 1947.** 822 p. Society of Automotive Engineers, Inc., 29 W. 39th Street, New York City, N. Y. $10.00 to nonmembers.

New data on hydraulic brake fluids, standards for involute serrated shafts, three types of crankcase oil, standards for pipe, filler and lubrication fittings, specifications for automotive steel castings, and general information on welding electrodes and copper and silver brazing, in addition to material revised from previous editions.

27-155. **Rules for Construction of Power Boilers.** Sections 1 and 6, and Appendix, A.S.M.E. Boiler Construction Code. 250 p. 1947. American Society of Mechanical Engineers, 29 W. 39th St., New York, N. Y.

Code adopted by A.S.M.E.

27-156. **Rules for Construction of Unfired Pressure Vessels.** Section 8, A.S.M.E. Boiler Construction Code. 182 p.

American Society of Mechanical Engineers, 29 W. 39th St., New York, N. Y.
Code adopted by the A.S.M.E.

27-157. Index to the Literature on Spectrochemical Analysis. Part II, 1940-1945. Bourdon F. Scribner and William F. Meggers. 180 p. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

1032 abstracted references arranged alphabetically by author within each of the years included. Most of the abstracts are quoted from *Chemical Abstracts.*

27-158. American Society for Testing Materials Proceedings, 1947. Volume 46. 1629 p. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Committee reports on ferrous and nonferrous metals, cementitious, concrete and masonry materials; miscellaneous subjects. Papers and symposiums on atmospheric weathering of corrosion resistant steels; fatigue; testing of parts and assemblies; testing of bearings; materials for gas turbines; metals; spectroscopic light sources; atmospheric exposure tests on nonferrous metals; statistical control in its application to specification requirements; and miscellaneous subjects. (This material has appeared previously in preprint or pamphlet form, or in *ASTM Bulletin.*)

27-159. Proceedings of the Institute of British Foundrymen. Volume 39. 325 p. 1945-1946. Institute of British Foundrymen, Saint John Street Chambers, Deansgate, Manchester, England.

Annual reports. Also castings and weldings, by Sir Claude D. Gibb. Control tests for gray cast iron. Fluidity testing of foundry alloys, by K. L. Clark. Standard test bars for the nonferrous foundry, by Frank Hudson. The influence of raw material on the properties of white-heart malleable cast iron with special reference to the influence of residual elements. Annealing rate in gaseous malleablizing, by D. M. Dovey and I. Jenkins. Notes on the process of gaseous malleablizing with especial reference to the use of steam, by D. M. Dovey. Some notes on hard wear resisting cast irons and steels, by Marcel Ballay and Raymond Chavy. The production of "grand slam" bomb castings, by Basil Gray. Hot blast cupola design, by E. Longden. Experiences with balanced air feed in the cupola, by T. H. Taft and H. A. Hallett. Heat treatment of gray cast iron for relief of internal stresses, by P. A. Russell. Determination of gas content of sand cores. Second report on the basic cupola. Sand supply to molding machines from overhead hoppers, by N. C. Blythe. Duplex pump castings, by R. H. Brown. Mass production of tank wheels in black-heart malleable, by A. B. Bill and J. Peers. Inspection in a mechanized foundry, by P. Cook. Cupola operation, by D. H. Young. The technological principles of casting design, by Victor M. Shestopal. Specification, design and production of iron castings for vitreous enameling, by John W. Gardom. Temperature measurement by means of immersion pyrometer, by E. Hunter, A. R. Parkes and J. W. Dews. The application of ethyl silicate to foundry practice, by Clifford Shaw. Some initial results on the influence of tellurium as a chill-inducing medium in cast iron, by A. N. Sumner. The formation of banded structures in horizontal centrifugal castings, by H. O. Howson. Also accompanying discussion.

27-160. Metal Industries Catalog. Fifth Edition. 551 p. Reinhold Publishing Corp., 330 W. 42nd St., New York 18, N. Y.

Alphabetical index; trade name index; equipment and materials classified index; engineering and metallurgical data section; manufacturers' catalogs; technical and scientific books.

27-161. Hard Surfacing by Fusion Welding. Howard S. Avery. 100 p. American Brake Shoe Co., New York, N. Y.

First of a series of monographs covers: economic advantages; hardness testing; abrasion and impact testing; galling; properties of the various materials used for hard surfacing; hard surfacing techniques; use of hard metal inserts; and applications. 40 ref. (To be published as a portion of text, "Engineering Laminates". Albert G. H. Dietz, editor.)

27-162. Minerals Yearbook. 1947. H. D. Keiser. 1689 p. United States Government Printing Office, Washington 25, D. C.

A general summary, information concerning the various metals and nonmetals in the form of articles by separate authors. Mine safety and foreign minerals.

27-163. Powder Metallurgy. Alexander Squire. U. S. Dept. of Commerce, Washington 25, D. C.

A collection of reports on wartime research from Watertown Arsenal Laboratory. (Reproduced by arrangement with the Office of Technical Services.)

27-164. Bibliography of Polarographic Literature: 1922-1945. 169 p. E. H. Sargent & Co., 155 to 165 E. Superior St., Chicago, Ill.

1078 references (no abstracts) and author and subject indexes.

27-165. Forming Alcoa Aluminum and Magnesium. 88 p. Aluminum Co. of America, Pittsburgh, Pa.

Properties and procedures found most satisfactory in commercial practice.

27-166. Transactions of American Society for Metals. Ray T. Bayless, Editor. V. 39, 1005 p. 1947. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

Includes the following papers which have been preprinted and abstracted in that form in the 1946 *Metal Literature Review*, v. 3, in section and number as indicated. A Metallographic Etchant to Reveal Temper Brittleness in Steel, by J. B. Cohen, A. Hurlich, and M. Jacobson (4-106). Development of Temper Brittleness in Alloy Steels, by W. S. Pellini and B. R. Queneau (18-238). Practical Importance of Hydrogen in Metal-Arc Welding of Steel, by S. A. Herres (22-533). Measurement of Embrittlement During Chromium and Cadmium Electroplating and the Nature of Recovery of Plated Articles, by Carl A. Zapffe and M. Eleanor Haslem (8-128). The Development of a Turbosupercharger Bucket Alloy, by E. Epremian (3-214). The Stress Rupture and Creep Properties of Heat Resistant Gas Turbine Alloys, by Nicholas J. Grant (3-215). Changes in Austenitic Chromium-Nickel Steels During Exposures at 1100 to 1700° F., by Peter Payson and Charles H. Savage (4-107). The Tempering of High-Alloy Toolsteels, by George A. Roberts, Arthur H. Grobe, and Christian F Moersch, Jr. (18-235). Constitution of the System Indium-Tin, by F. N. Rhines, W. M. Urquhart, and H. R. Hoge (4-104). Pole Figures of the Effect of Some Cold Rolling Mill Variables on Low-Carbon Steel, by John Karl Wood, Jr. (19-276). Stability of Austenite in Stainless Steels, by C. B. Post and W. S. Eberly (4-103). Quantitative Evaluation of Intergranular Corrosion of 18-8 Ti, by Freeman J. Phillips (6-121). Isothermal Transformation of Austenite, by Axel Hultgren (4-109). Also includes 23 other papers which are abstracted separately.

27-167. Transactions of American Society for Metals. Ray T. Bayless, Editor. V. 38, 1022 p. 1947. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $5.00.

Contains the following papers which have been preprinted and abstracted in that form in 1946 *Metal Literature Review*, v. 3, in section and number as indicated. The Chromium-Oxygen Equilibrium in Liquid Iron, by Hsin-Min Chen and John Chipman (2-139). The Apparent Influence of Grain Size on the High-Temperature Properties of Austenitic Steels, by C. L. Clark and J. W. Freeman (3-216). Experimental Studies of Continuous Cooling Transformations, by C. A. Liedholm (4-108). The Interrupted Quench and Its Practical Aspects, by Howard E. Boyer (18-239). A Periodic Chart for Metallurgist, by Carl A. Zapffe (4-105). The Measured Knoop Hardness of Hard Substances and Factors Affecting Its Determination, by Newman W. Thibault and Helen L. Nyquist (9-134). The Effect of Manganese on the Properties of Cast Carbon and Carbon-Molybdenum Steels, by N. A. Ziegler, W. L. Meinhart, and J. R. Goldsmith (3-217). Relation of Quenching Rate and Hardenability to the Mechanical Properties of Several Heat Treated Cast Alloy Steels, by Charles R. Wilks, Howard S. Avery, and Earnshaw Cook (18-240). Hardness Testing of Metals and Alloys at Elevated Temperatures, by Frederick P. Bens (9-133). Influence of the Strain Rate and the Stress System on the Mechanical Properties of Copper, by D. J. McAdam, Jr., G. W. Geil, and D. H. Woodard (9-54). Formation and Transformation Studies of Iron Carbon Powder Alloys, by John F. Kahles (5-67). Carbon Concentration Control, by E. G. de Coriolis, O. E. Cullen, and Jack Huebler (18-237). Some Special Metallographic Techniques for Magnesium Alloys, by P. F. George (4-102). Plastic Deformational Analyses on Pure Magnesium, by Louis A. Carapella and William E. Shaw. The Effects of Microstructure on the Mechanical Properties of Steel, by J. H. Hollomon, L. D. Jaffe, D. E. McCarthy, and M. R. Norton (4-111) Factors Influencing the Pearlitic Microstructure of Annealed Hypoeutectoid Steel, by R. A. Grange (4-112). Also includes 15 other papers which are abstracted separately.

27-168. Transactions of the American Institute of Mining and Metallurgical Engineers; Institute of Metals Division. V. 166, 622 p. 1946. The Institute, 29 West 39th St., New York 18, N. Y.

Contains papers presented before meetings of the society and previously published in *Metals Technology* in 1945 and 1946.

27-169. Proceedings of the Society for Experimental Stress Analysis. V. 4, No. 2 C. Lipson and W. M. Murray, Editors. 121 p. 1947. Addison-Wesley Press, Inc., Cambridge 42, Mass. $5.00.

Fatigue Tests of Major Aircraft Structural Components, by W. G. Pierpont. Precision Determination of Stress-Strain Curves in the Plastic

Range, by John R. Low. A Method of Detecting Incipient Fatigue Failure, by Henry W. Foster. A Machine for Fatigue Testing Full-Size Parts, by A. F. Underwood and C. B. Griffin. Some Repeated Load Investigations on Aircraft Components, by S. A. Gordon. Stress Analysis Utilization in Dynamic Testing, by Roy W. Brown. Device for Maintaining Continuous Electrical Connections With Reciprocating Engine Parts, by W. A. Wallace and W. A. Casler. Evaluation of Various Methods of Rotor-Blade Analysis by Means of a Structural Model, by Robert Mayne. Reluctance Gages for Telemetering Strain Data, by W. H. Pickering. The Linear Variable Differential Transformer, by Herman Schaevitz. Design and Application of Accelerometers, by David E. Weiss. Aircraft Instruments for Radio-Telemetering and Television-Telemetering, by Carl L. Frederick.

27-170. Electronic Methods of Inspection of Metals. 189 p. 1947. American Society for Metals, Cleveland, Ohio. $3.50.

Seven educational lectures: Electronic Methods for the Measurement of Strain in Metals, by H. F. Hamburg. Spectrochemical Analysis of Metals and Alloys by Direct Intensity Measurement Methods, by J. L. Saunderson. Uses of the DuMont Cyclograph for Testing of Metals, by R. S. Segsworth. Supersonic Methods of Metal Inspection, by E. O. Dixon. Determination of Seams in Steel by Magnetic Analysis Equipment, by Charles M. Lichy. The Electron Microscope and Its Application to Metals, by Charles S. Barrett. Electronics in Liquid Steel, by Harold T. Clark

27-171. The Examination of Arc Welds in the Shipyard. 29 p. His Majesty's Stationery Office, London, England. 1s.

Recommendations by the admiralty ship-welding committee for the guidance of shipbuilders, designers, and inspectors.

27-172. British Iron and Steel Directory. 224 p. The Metal Bulletin, London, England. 5s.

An up-to-date guide to British producers and suppliers of all kinds of iron and steel. The classified section lists a wide range of products and their suppliers, while an alphabetical section gives full addresses, telephone numbers, and telegraphic addresses.

27-173. An Introduction to the Electron Theory of Metals. G. V. Raynor. 98 p 1947. The Institute of Metals, Grosvenor Gardens, London, S.W.1, England, 6s, 3d.

Written primarily for the older metallurgist who is unfamiliar with the approach of the physicist to metallurgical problems. It attempts to interpret, as far as possible non-mathematically, some of these concepts. It does not claim to give full and complete knowledge of the subject.

27-174. Notes on Gage Making and Measuring. Edition 2. 73 p. National Physical Laboratory, Metrology Dept., His Majesty's Stationery Office, London, England. 2s.

Much unique information and data on diamond tools for truing grinding wheels on surface grinders for gage grinding. The second edition seems to be practically identical with the first, with the exception of a few added illustrations and an appendix of tables for use in taper measurements.

27-175. Cutting Tools for Metal Machining. M. Kurrein and F. C. Lea. 312 p 1947. Charles Griffin & Co., Ltd., London, England. 28s.

Data and comparison on British Continental, and American practice. Deals in great detail with the process of finish turning by sintered carbide and diamond tools. Two comprehensive tables give ordinary service data for turning and boring with diamond tools.

27-176. Steel Construction: A Manual for Architects, Engineers and Fabricators of Buildings and Other Steel Structures. Edition 5. 432 p. 1947. American Institute of Steel Construction, 101 Park Ave., New York, N. Y. $2.00.

Data most frequently referred to by structural estimators and designers; the data required in making shop drawings; tables of allowable loads; standard specifications and codes; and miscellaneous data and mathematical tables for ready reference.

27-177. Igneous Minerals and Rocks. Ernest E. Wahlstrom. 367 p. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $5.50.

Igneous rock-making minerals including their optical examination and supplementary methods for their determination. The chemical composition of each mineral together with special chemical tests and physical properties. Mineral habits and associations. Mineral identification. Part II deals with the igneous rocks, their structure, texture, color, alternations and chemical composition.

27-178. Workshop Calculations for Machine Tool Operators. G. Williams. 170 p. Sir Isaac Pitman and Sons, Ltd., Parker St., Kingsway, London, W.C.2. England. 10s, 6d.

Midway between the practical and

purely academic, this book aims to bridge the gap between classroom teaching and application in toolroom or workshop. Analysis of workshop practices and the mathematics involved The theory of change-speed gears; taper turning, screw threads, and indexing and spiral milling; spur, spiral, bevel, and worm gears in theory and practice; miscellaneous workshop operations; and the systems of fits and tolerances in common use.

27-179. **Watkins Cyclopedia of the Steel Industry.** Edition 1. 468 p. 1947. Steel Publications, Inc., 108 Smithfield Street, Pittsburgh 30, Pa. $10.00.

A.I.S.I. statistics and articles on coking and coke ovens, iron-ore beneficiation, nodulizing, sintering and smelting, steel-melting processes, rolling and shaping, steel plant refractories, carbon and alloy steels, fabrication, welding, cleaning and finishing, inspection and testing, steel processing furnaces, materials handling.

27-180. **Milling With Carbides.** 41 p. Metal Cutting Tool Institute, 6400 Chrysler Bldg., New York 17, N. Y. $1.00.

General considerations including cost factors; data on the characteristics of various grades and brands of carbide. Requirements for machine tools and fixtures; nomenclature for milling cutters; factors involved in cutter design; speeds and feeds.

27-181. **Heat Treatment of Aluminum Alloys.** 31 p. Aluminum Company of Canada, Ltd., Montreal, Canada. Gratis.

Booklet prepared to assist the users of aluminum alloys in solving their heat treating problems begins with a simple explanation of fundamental theory.

27-182. **Infrasizer.** 43 p. 1946. Infrasizer's Limited, Toronto, Canada.

A laboratory instrument for splitting subsieve size particles into seven products, based on the settling rates of the particles in air, using six cones in series. Details of development, the results obtainable with it, and limitations.

27-183. **Turbimetric Particle Size Analysis.** J. R. Musgrave and H. R. Harner. 47 p. 1947. Eagle-Picher Co., American Bldg., Cincinnati 1, Ohio.

Monograph gives a complete description of the methods used in Eagle-Picher's laboratories. 289 ref.

27-184. **British Nonferrous Metals Research Association Twenty-Seventh Annual Report.** 43 p. British Nonferrous Metals Research Association, Euston St., London, N.W.1, England.

A review of research progress for the past year.

27-185. **D.S.I.R.—A Description of the Work of the Department of Scientific and Industrial Research.** 31 p. 1946. Department of Scientific and Industrial Research, Park House, 24 Rutland Gate, South Kensington, London, S.W.7, England.

Organization, facilities, and programs of British Government research.

27-186. **Digest of Steels for High Temperature Service. Edition** 5. 215 p. 1946. The Timken Roller Bearing Co., Steel and Tube Div., Canton 6, Ohio.

Complete high temperature data on 22 steels which have found general use in many different types of applications. Important physical properties compared.

27-187. **Bituminous Coatings for the Protection of Iron and Steel Against Corrosion.** R. St. J. Preston. 39 p. 1946. His Majesty's Stationery Office, London, Department of Scientific and Industrial Research, London, England.

Bituminous coatings are classified in respect to their media and pigments and their value for the protection of iron and steel against corrosion, particularly under immersed conditions. A survey of compositions used for protection against fouling by marine organisms. 256 ref.

27-188. **Spectroscopy of Lead Oxides for the Storage Battery Industry.** E. J Dunn, Jr., and A. J. Mitteldorf. 24 p. 1947. National Lead Co. Research Laboratories, Brooklyn, New York.

The principle of the spectrochemical method, based upon a d.c. arc procedure. The techniques were established by a study of the fundamental aspects of burning the dried salt standards under varying conditions in the ultraviolet and visible ranges of the spectrum. A device for automatically centering the carbon electrodes in the Petrey stand.

27-189. **Frozen Motion or Chip Contours as a Clue to the Mechanisms of Metal Cutting.** William H. Oldacre and Harry A. Erickson. 11 p. June 1947. D. A. Stuart Oil Co., Ltd., 2727 S. Troy St., Chicago 23, Ill.

Preliminary work indicates that much can be learned concerning the mechanism of metal cutting from a careful study of chip shape and microstructure. Chips produced by six different cutting speeds reveal a striking gradation in shape, from a small tight spiral at the lowest speed to an almost straight chip at 536 r.p.m.

27-190. **Dynamic and Static Compression Testing of ⅜-in. Copper Balls. (Report R-240.)** D. E. Abkowitz. 22 p. July 1947. Navy Department, David Taylor Model Basin, Washington 25, D. C.

Copper balls, for use in ball-crusher gages, were calibrated statically and dynamically to investigate the relationship of speed effect to deformation. The falling-weight apparatus used in the dynamic calibrations, and the results in energy-deformation curves.

27-191. **Machine Production 1947, Burgess Directory.** 164 p. 1947. Monetary Times Printing Co. of Canada, Ltd., 341 Church St., Toronto 2, Canada.

Information on the Canadian and American tool and machine-tool markets. Alphabetical index of commodities; names and addresses of manufacturers and dealers; and a directory of dealers and distributors.

27-192. **Bibliography on the Properties of Chromium-Nickel Stainless Steels; 1935-1945.** 116 p. 1947. International Nickel Co., 67 Wall St., New York 7, N. Y.

Scope is limited to iron-base alloys containing 12 to 30% Cr and 6 to 30% Ni, with or without alloy additions. Corrosion properties have been omitted. The abstracts are arranged by year of publication and the headings by A.I.S.I. compositions; or, if nonstandard, the Cr and Ni contents and any alloy additions.

27-193. **Properties of Frequently Used Carbon and Alloy Steels. Edition 3. (Booklet 211.)** 131 p. 1946. Bethlehem Steel Co., Bethlehem, Pa.

Recommended heat treatments, hardenabilities, quenching media, magnetic inspection, machinability, phase transformations, decarburization, and the properties of various steels.

27-194. **Theory and Application of Radio-Frequency Heating.** George H. Brown, Cyril N. Hoyler, and Rudolph A. Bierwirth. 370 p. 1947. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York 3, N. Y. $6.50.

Fundamental principles treated thoroughly. Mathematics is used liberally, but graphical analysis aids in its clarification. Applications described, including annealing brass and bronze, paint baking, brazing, case hardening, wood gluing, dehydration, pasteurization, sterilization, and cooking.

27-195. **Elements of Mechanism.** Peter Schwamb, Allyne L. Merrill and Walter H. James. 428 p. 1947. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $3.75.

Application of the fundamental principles of kinematics in the field of mechanical movements. The more common and more fundamental machine elements are selected, and their motions when combined in certain definite ways studied.

27-196. **Analyzes Lake Superior Iron Ores, Season 1946, With Other Statistical Tables and a Direction of Mine Operators.** 51 p. 1947. The Lake Superior Iron Ore Assoc., 1170 Hanna Bldg., Cleveland, Ohio. Gratis.

Statistical data include mine shipments, shipments from lake ports and all-rail, furnace consumption and stocks.

27-197. **Steel Plates and Their Fabrication.** 408 p. Lukens Steel Co., 323 Lukens Bldg., Coatesville, Pa. $5.00.

Processes by which they are fabricated, and commercially standardized formed plates such as flanged and dished heads. A comprehensive analysis of the strength of plates subjected to a wide range of conditions of support and loading.

27-198. **Verfahrens und Messkunde der Naturwissenschaft. Heft 3. Messmittel und Prufverfahren in der Mechanisch-technologischen Metallprufung. (Procedures and Measuring Techniques in Natural Science. Part III. Measuring Instruments and Test Methods for Mechanical-Technological Metal Testing.)** Gunter Hahn. 102 p. Friedrich Vieweg & Sohn, Braunschweig, Germany. (Republished 1946 by J. W. Edwards, Ann Arbor, Mich.)

The various methods for determining the mechanical properties of metals. 40 ref.

27-199. **Induction Heating.** By "Heat-Treater". 147 p. Chapman and Hall, Ltd., 37 Essex St., London, England. 10s, 6d.

Induction heating and the rapid developments in the manufacture of the electronic type of high-frequency generator. Broad field of application.

27-200. **An Introduction to Metallurgy.** Joseph Newton. 645 p. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. $5.50.

This second edition, largely rewritten and as modern as plutonium, is a masterpiece of condensation. Some accurate information is contained on almost any branch of the subject you might think of except pyrometry—omitted for an unstated reason, and hardly understandable except to an instructor in a western school in view of the 60 pages devoted to ore dressing. A curious inversion places "adaptive metallurgy" (from atoms to heat treatment) in the first half of the book and "extractive metallurgy" (from ores to electrolytic refinery) in the rear. Only a teacher of wide experience could say whether an encyclopedic book like this is a better text than one of equal bulk that gives a more detailed story about things of greatest engineering and economic importance and says practically nothing about a multitude of fascinating byproducts. E.E.T.

27-201. 1946 Book of A.S.T.M. Standards Including Tentatives. Part I-A. Ferrous Metals. 1181 p. **Part I-B. Nonferrous Metals.** 917 p. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. $8.00 for each part, for nonmembers.

Each part carries a detailed index and two tables of contents, one listed by general materials, the other by numerical sequence of designations.

27-202. Controlled Atmospheres in Heat Treatment. G. T. Dunkley. 69 p. Sir Isaac Pitman and Sons, Ltd., 39 Parker St., London, W.C.2., England. 7s, 6d.

Excellent introduction for plant technicians who wish to familiarize themselves with the underlying principles of the process. Physico-chemical aspects, various types of atmosphere and generating plant, and "bright" heat treatment operations.

27-203. The Metallization of Plastics. J. R. I. Hepburn. 71 p. Cleaver-Hume Press, Ltd., 42a South Audley St., London, W.1., England. 6s.

All the processes at present in use for depositing metals on plastics—solution treatment, metal spraying and cathode sputtering. Characteristics of the deposits formed and methods of testing them for defects.

27-204. A Practical Theory of Mechanisms. Paul Grodzinski. 166 p. Emmott & Co., Ltd., 21 King St. W., Manchester 3, England. 7s, 6d.

This pocket-sized volume is more of a handbook than a text, although it does start with fundamental concepts and explanations. Examples from the simplest linkages with their common inversions to the more complex types are given.

27-205. Rolling Bearings. R. K. Allan. Sir Isaac Pitman and Sons, Ltd., Parker St., Kingsway, London W.C.2, England. 30s.

The term "rolling bearings" is applied to ball and roller bearings of all types. A historical note on bearing development, then the elementary mechanics of the subject, friction, rolling elements, cages, track curvature, and contact areas. Fundamental equations deduced for various types of bearings. Materials and manufacturing processes. The researches of Hertz, Stribeck, and Goodman, with mathematical development of their respective theories, followed by practical application to specific types of bearings. Palmgren's work on the endurance of rolling bearings and the formulas relating to bearing life.

27-206. Hardenability of Alloy Steels. Society of Automotive Engineers, Inc., 29 W. 39th St., New York 18, N. Y. $2.00. Members $1.00.

Published jointly by S.A.E. and A.I.S.I., this book covers current data on designing, testing and ordering steels by hardenability-band specifications. Other sections discuss selection of automotive steels on the basis of hardenability and the S.A.E. method of determining hardenability. Conversion of steel hardness numbers.

27-207. Working With Aluminum. Douglas B. Hobbs. Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis. $2.50.

Twenty-five projects involving basic metalworking processes. Processes correlated with the projects include coremaking, countersinking, drawing, etching, filing, finishing, hammering, machining, riveting, sawing, scroll forming, spinning, tapping, threading, and twisting.

27-208. Lessons in Arc Welding. Edition 3. 158 p. Lincoln Electric Co., 12818 Coit Rd., Cleveland, Ohio. $0.50.

A thorough revision of the previous editions with added feature of questions and answers section. Both a.c. and d.c. welding methods, new procedures covering large electrodes, and a number of lessons on pipe welding. The problem of distortion and its prevention and control.

27-209. Valve Gear Design. Michael C. Turkish. 130 p. Eaton Mfg. Co., 739 E 140 St., Cleveland, Ohio. $6.00.

A comprehensive design study of valve-gear problems. Design formulas and computations for cams, tappets, and valve springs, profusely illustrated with line drawings, curves, and charts. Mathematical tables to aid in the solution of certain types of cam design problems. Formulas for calculating contact stresses. Laboratory studies of various types of valve-gear mechanisms in relation to design applications.

27-210. Praktische Verzahnungstechnik. (Practical Gear Tooth Generation.) Edition 3. 178 p. Walter Krumme. Carl Hanser Verlag, Munich 27, Germany.

Various modern methods used in the production of efficient gears. Clamping devices and wheel truing devices for gear grinding machines. While not neglecting the various chip producing methods of generating gear teeth, grinding and lapping methods are dealt with extensively. Data for calculating operation times for the various machine types.

27-211. Les Metaux et Alliages. (Traite de Metallographie.) [Metals and Alloys. (A Treatise on Metallography.)] Jean Marechal. 303 p. Editions Soledi, Liege, Belgium.

The first part is a general study of metals and alloys—allotropy, solid so-

lutions, alloys, equilibrium systems, LeChatelier's law. Metallographic techniques and physical, mechanical, and chemical properties. Part II reviews the metallographic properties of each of the more important metals and its alloys.

27-212. **Mechanical Vibrations.** J. P. Den Hartog. Edition 3. 478 p. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $6.00.

Essentially a revision of previously published material. New material on electronic instrumentation, torsional vibration dampers, airplane wing flutter, and helicopter ground vibration.

27-213. **The Metal Bulletin's British Iron and Steel Directory.** 224 p. 1947. Metal Information Bureau, Ltd., Princes House, 39 Jermyn St., London, England.

A classified directory of producers, merchants and agents of iron and steel intended primarily for the use of overseas buyers.

27-214. **British Nonferrous Metals Directory.** 224 p. Metal Information Bureau, Ltd., 39 Jermyn St., London, England.

The suppliers of British raw and semifinished nonferrous metals.

27-215. **Metal Working and Heat Treatment Manual. Volume II.** F. Johnson. 226 p. Central Technical College, Birmingham, England. 17s. 6d.

Volume I of this series dealt with carbon steels only. The present volume deals with alloy steels, cast iron, and nonferrous metals.

27-216. **The Escalator Method in Engineering Vibration Problems.** Joseph Morris. 270 p. Chapman & Hall, Ltd., 37 Essex St., W.C.2, London, England.

An account of the methods of solution adopted or developed by the author for dealing with strength and vibration problems in engineering practice, in particular, in aircraft engineering.

27-217. **The Manufacture of Refractories and Information Concerning Their Use in the Iron and Steel Industry of Western Germany.** G. E. Seil, S. M. Phelps, F L. Toy, J. W. Whittemore, A. T. Green, J. H. Chesters, M. Douglas, M. F. Goudge and G. R. Rigby. 112 p. Mapleton House, 5415 17th Ave., Brooklyn 4, N. Y. (Reproduced from F.I.A.T. Final Report No. 432; and PB 37804, Office of Technical Services, Dept. of Commerce, Washington.) $3.00.

Results obtained by a British-American team visiting 15 refractory and two steel plants. A brief summary of information is followed by details of each visit. Except for the use of carbon hearths, differences from British and American practice are not noteworthy. The appendix contains translations, in whole or in part, of four reports of the Steelworks Committee of the German Iron and Steel Institute on standardization of various refractory shapes and materials.

27-218. **Electric Furnace Design; Manufacture and Application in Germany.** W. J. Millar and Others. 109 p. Mapleton House, 5415 17th Ave., Brooklyn 4, N. Y. (Reproduced from PB 32566, Office of Technical Services, Dept. of Commerce, Washington.) $3.00.

Summary of results obtained by investigating team is followed by details of the individual plant visits.

27-219. **Symposium on Atmospheric Weathering of Corrosion Resistant Steels.** 92 p. American Society for Testing Materials, 1916 Race St., Philadelphia. Pa. $1.50.

An up-to-date picture of the behavior of the stainless steels when exposed to atmosphere. A collection of seven technical papers delivered during the symposium sponsored by A.S.T.M. Committee A-10 on Iron-Chromium, Iron-Chromium-Nickel, and Related Alloys, and held at the 1946 A.S.T.M. meeting.

27-220. **Metals and Plastics; Production and Processing.** Thomas P. Hughes. 384 p. Irwin-Farnham Publishing Co., 332 S. Michigan Ave., Chicago 4, Ill. $4.50.

Processes in manufacturing industrial parts and a study of some of the more common metals, alloys, and plastics. For engineers.

27-221. **Machine Shop Operation. Volume 1—Lathe Operations. Volume 2—Milling Machine Operations. Volume 3—Shaper Operations.** Lewis E. King. The Macmillan Co., 60-62 Fifth Ave., New York City, N. Y. $1.00 each.

The first book deals with the general-purpose back-geared screw-cutting lathe, the fundamental principles involved in its operation, and the cutting tools generally used. The second book treats similarly of horizontal and vertical milling machines, and the uses of their various attachments. The third book takes up the shaping of horizontal, vertical and irregular surfaces, angular surfaces, dovetails, slots and keyways.

27-222. **Contributions to the Metallurgy of Steel. No. 11. Hardenability of Alloy Steels. Revised Edition.** 146 p. American Iron and Steel Institute, 350 Fifth Ave., New York, N Y.

Tentative hardenability bands applicable when H steel chemistry is specified; selection of automotive steel on the basis of hardenability; standard end-quench hardenability test procedure; hardness conversion numbers.

27-223. **The Welding Encyclopedia. 12th Edition.** L. B Mackenzie, compiler and editor. 1024 p. The Welding Engineer Publishing Co., 330 W 42nd St., New York, N. Y.

27-224. Allcast Aluminum Alloy SC8. Revised Edition. 8 p. National Smelting Co., 6700 Grant Ave., Cleveland 5, Ohio. Gratis.

Properties and applications of alloy containing 3.5% Cu and 6% Si

27-225. Control Charts—an Introduction to Statistical Quality Control. Edward S. Smith. 160 p. McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. $3.00

This book, by the professor of mathematics at University of Cincinnati's Engineering College, enhances his reputation as a teacher and author of understandable textbooks in mathematics. During the last war, Professor Smith devoted much time to the organization and teaching of standard intensive courses on quality control in various ordnance plants under the auspices of the War Production Board. This book profits from that contact with a large number of men with only the sketchiest of mathematical backgrounds, and is therefore recommended to any production executive who desires to improve quality of his plant's product at lower cost by means of statistical quality control. E.E.T.

27-226. Atlas Metallographicus. Band III. Aluminium. Erster Teil: Binare Legierungen des Aluminiums. (Atlas of Metallography. V. 3. Aluminum. Part I: Binary Alloys of Aluminum.) Heinrich Hanemann and Angelica Schrader 126 p., 1941. Gebruder Borntraeger Berlin-Zehlendorf, Germany. (A photostatic reproduction.)

The latest information available to the authors is concisely compiled. Numerous photomicrographs and tables. 45 ref.

27-227. Aircraft Materials and Processes. 3rd Edition. George F. Titterton. 537 p., 1947. Pitman Publishing Corp., 2 W. 45th St., New York, N. Y. $4.75.

Physical terms, heat treatment terms, and physical test terms defined Testing of aircraft materials; properties and uses of aircraft steels; heat-treatment and surface hardening of steel, shaping of metal; corrosion-resisting steels; nickel, copper, and wrought aluminum alloys; aluminum-alloy castings; magnesium alloys; metal joining processes; corrosion and its prevention; wood and glue; fabrics, plastics, and rubber; and the selection of materials. Extensive reference data.

27-228. Grundlagen Der Eisengewinnung. (Principles of Iron Production.) Robert Durrer. 210 p., 1947. Verlag Francke A G., Bern, Switzerland.

An elementary text for beginning students in metallurgy. Theory, equipment, and procedures.

27-229. Flotation Fundamentals. 2nd Edition. 54 p. Dow Chemical Co., 310 Sansome St., San Francisco, Calif.

The history of the development of flotation, and the chemicals that cause the process to function effectively. The xanthates and the flotation of sulphide minerals. Intended primarily for students and nontechnical plant personnel.

27-230. United States Patents on Powder Metallurgy. Raymond E. Jager and Rolla E. Pollard. 139 p., 1947. U. S. Government Printing Office, Washington 25, D. C. $0.30.

Patents issued from 1836 up to Jan. 1, 1947, are listed under a number of groups and subgroups. In each case they are arranged according to number, together with a brief description of scope.

27-231. 1947 Guidebook and Directory for the Metal Finishing Industries. 436 p. Metal Industry Publishing Co., Inc., 11 West 42nd St., New York 18, N. Y.

Combines 16th edition of "Plating and Finishing Guidebook" and 6th edition of "Metal Finishing Buyers Directory". Abrasive methods; cleaning and pickling; electroplating solutions; surface treatments; control and testing; chemical tables; organic finishes; and organic methods.

27-232. O.S.R.D. Reports. 105 p. June 1947. Office of Technical Services, Dept. of Commerce, Washington 25, D. C. (P.B. 78000).

A bibliography and index of the numbered publications available from the Office of Technical Services. Arranged by O.S.R.D. number with corresponding P.B. numbers; a cross reference list according to P.B. number with corresponding O.S.R.D. numbers; an author index; and a subject index.

27-233. Metal Industry Handbook & Directory. 36th Edition. 468 p., 1947. Louis Cassier Co. Ltd., Dorset House, Stamford St., London, S.E.1, England.

General properties; general data and tables; electroplating, finishing, galvanizing, and anodizing; and directory. The coverage appears to be British only.

27-234. The British Nonferrous Metals Directory. 224 p. Metal Bulletin, London, England. 5s.

An up-to-date and comprehensive guide to British suppliers of raw and semifinished nonferrous metals. A classified section lists a wide range of nonferrous products, together with their suppliers.

27-235. Nonferrous Production Metallurgy. 2nd Edition. John L. Bray. 587 p., 1947. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y. $5.00.

A textbook of production metallurgy. Several of the author's ideas as to methods of presentation are followed with resulting benefit to the student. For instance drawings are simplified so that the usual multiplicity of details will not confuse the novice. Three introductory chapters are followed by separate chapters on each of the important metals. Chapters on secondary metals; marketing of bullion, ore, and concentrates; and use of physical chemistry in metallurgical processes. New illustrative problems, developments during World War II, and discussions of the strategic position of the U. S. with regard to each of the metals.

27-236. The Mechanical Working of Steel. Edwin Gregory and Eric N. Simons. 198 p. Sir Isaac Pitman & Sons, Ltd., Pitman House, Parker Street. Kingsway, London, W.C.2, England 10s, 6d.

Developments that have taken place in the technique of the hot and cold working of metals, and the structures produced by the various types of operations and how these can be modified to produce the best results. The importance of choosing the right type of material. The problems that arise in the cold working and pressing of metals in relationship to the changes that occur due to overstraining and during heat treatment.

27-237. Heat Treatment of Steel. A. P. Guliaev, Iu. M. Lakhtin, and A. I. Tarusin. 282 p. 1946. State Scientific-Technical Publishing House for Machine Construction Literature, Moscow, U.S.S.R. (In Russian.)

Theory and practice but no data concerning conditions of practical applications. Principal purpose is to interpret and evaluate data and theories concerning the mechanisms involved in heat treating.

27-238. Handbook of Uranium Minerals. Jack DeMent and H. C. Dake. 80 p. 1947. Mineralogist Publishing Company, 329 Southeast 32nd Ave., Portland 15, Oregon. $1.50.

An exposition and catalog of the uranium and thorium minerals, including methods for their detection, location, and exploration. A short bibliography.

27-239. The Technology of Industrial Fire and Explosion Hazards. R. Cecil Smart. V. 1, 191 p.; v. 2, 176 p. 1947. Chapman & Hall, Ltd., London, England. 16s. ea. vol.

Volume I surveys the general problem and deals with the thermal reactions of materials and fire hazards in agricultural products, coal, and industrial solid and liquid fuels and gases; heat treatment of metals by molten nitrate baths; fire and dust-explosion hazards of magnesium alloys. Volume II covers wood products, oils, fats, and waxes; industrial solvents; paints, varnishes, and lacquers; infrared heating; explosives; plastics; protective metal coatings; lamp-black, paper, and printing inks; combustible fibers, linoleum, and textiles; dusts and toxic gases; and fire hazards due to electricity, lighting and static electricity. Absence of references in many cases makes it rather difficult to assess the value of the data.

27-240. Tantalum and Niobium. Keith R. Miles, Dorothy Carroll, and H. P. Rowledge. 150 p. 1945. Department of Mines, Perth, Australia. (Bulletin No. 3.)

Part 1 gives the geology of the productive areas, the minerals occurring and mined, hints to prospectors searching for tantalum minerals, and information about marketing and values. Part 2 lists all the known tantalum and columbium minerals and gives methods of extracting the metals from the ores, the properties of tantalum and columbium, alloys and compounds formed, and uses made of the metals and alloys. Part 3 describes occurrence in Western Australia of associated minerals with some general details concerning their group properties. Details of crystallography and of physical, chemical, and optical properties are given for each mineral.

27-241. Production Processes—Their Influence on Design. Roger W. Bolz. 100 p. 1946. Penton Publishing Co., Cleveland 13, Ohio. $1.00.

A series of articles reprinted from *Machine Design*, July 1945 through Sept. 1946, covering broaching, spinning, automatic screw machining, die forging, turret-lathe machining, stamping, deep drawing, Swiss automatic machining, gear-shaper generating, roll forming, contour sawing, flame cutting, cold heading, section contour forming, and shot-peening.

27-242. Welding Encyclopedia. 12th Edition. L. B. Mackenzie, editor; T. B. Jefferson, re-edited. 1024 p. 1947. Welding Engineer Publishing Co., McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $6.50.

All terms relating to metal joining and cutting by the application of heat, including heat treating processes and other allied subjects. Photographs, line drawings, graphs, data, tables, and equilibrium diagrams are extensively used to illustrate or amplify the text. Various pertinent codes, standards, and specifications are ap-

pended, and there is a 90-page list of trade names with descriptive information.

27-243. Stabilitat der Platten in plastischen Bereich, Theorie von A. Iljuschin mit Vergleichswerten von durchgefuhrten Versuchen. (Stability of Plates in the Plastic Region, Theory of A. Iljuschin With Comparative Values From Completed Research.) C. F. Killbrunner and G. Herrmann. 81 p. 1947. Verlag Ag. Gebr. Leeman & Co., Zurich, Switzerland. 12 Swiss francs.

Application of the theory presented to plates stressed by uniformly distributed pressure on one side and comparisons with results of actual tests. Conclusions reached are summarized and there is a brief bibliography.

27-244. The Light Metals Industry. Josephine Perry. 128 p. Longmans, Green and Co., Inc., 55 Fifth Ave., New York 3, N. Y. $2.00.

Aim of the author is to present "a broad true picture of this fascinating young industry" for American boys and girls. History, processes of manufacture, methods of fabrication, uses of, and research on aluminum and magnesium are covered.

27-245. Electroplating and Metal Finishing Standards. Metal Finishing Association, 93-94, Hatton Garden, London, E.C.1, England. 2s.

First of a series of handbooks. Sections on nickel, decorative chromium, copper, zinc, cadmium, lead, tin, precious metals, heavy deposition, and anodizing. Under precious metals are included gold, silver, platinum, rhodium and palladium.

27-246. Handbook of Industrial Electroplating. E. A. Ollard and E. B. Smith. 308 p. 1947. Louis Cassier Co., Ltd., London. 15s.

Data on electroplating, including the installing and maintaining of electrodeposition plants.

27-247. Dauerstandfestigkeit von Zinklegierungen. (Creep in Zinc Alloys.) O. H. C. Messner. 54 p. 1947. Buchdruckerei Vogt-Schild A. G., Solothurn, Switzerland.

New experimental data on two grades of zinc and on alloys of six compositions, Al and Cu being the chief alloying elements. Each alloy was examined after various treatments. Creep tests, mostly of 100 hr. duration, were performed at loads of from 0.5 to 10 kg. per sq.mm., and a few were continued for 1000 hr. Measurements were also made of tensile strength and other mechanical properties. Photomicrographs. Creep strength defined in 19 different ways.

27-248. Magnetic-Powder Defect Detection. N. I. Eremin. 188 p. 1947. Scientific Research Institute for Heavy Industry, Moscow and Leningrad, U.S.S.R. (In Russian.)

Results of a thorough study of modern magnaflux methods. All existing data, including the results of the author's long-time research. This work is believed to be a very valuable contribution to the means of detection of internal defects, particularly in welded structures. 109 ref.

27-249. Nature of Chemical Bonds in Metallic Alloys. H. V. Ageev. 118 p. 1947. Academy of Sciences of U.S.S.R., Moscow, U.S.S.R. (In Russian.)

Study of the data in the technical literature together with data obtained by the author concerning the nature of the chemical bond in metallic alloys. Existing theoretical and experimental material is correlated in order to aid in planning future research on such problems. 190 ref.

27-250. Protection of Metals From Corrosion. A. M. Iampol'skii. 100 p. 1946. State Scientific-Technical Publishing House, Sverdlovsk and Moscow, U.S.S.R. (In Russian.)

Different factors causing corrosion of metals. A series of methods for reduction or elimination of corrosion are proposed. Metallic and nonmetallic electrodeposition are investigated and the composition of electrolytes and the technology of the processes are thoroughly studied. 44 ref.

27-251. Notes on Screw Gages. 5th Edition. 74 p. 1944. His Majesty's Stationery Office, London, England.

Brief descriptions of the principles underlying the practice of limit gaging as applied to parallel-screw threads, the various types of error met with in screw gages, and modern methods of testing these gages, supplemented by data required for carrying out the measurements. The instruments described are, for the most part, obtainable commercially.

27-252. Workshop Practice. 9th Edition. F. Johnstone Taylor. Technical Press, Ltd., Gloucester Rd., Kingston Hill, Surrev, London, England. 18s.

A revised and enlarged edition of E. Pull's "Modern Workshop Practice". Chapters on materials have been written and much additional information is given on modern gear-cutting machines and systems of testing gears and grinding. New chapters dealing with forging and welding supersede matter of less concern to the workshop machinist.

27-253. Petrographic Microtechnique. A. V. Weatherhead. 102 p. Arthur Barron, Ltd., London, England. 12s, 6d.

Methods used in the preparation of thin sections of rocks and similar material for examination under the microscope. All the various techniques now extant are brought together within the compass of a single volume. Only in one or two instances are any new methods developed by the author given. However, the work is by no means a mere compilation of the well-known methods, but rather a record of the technique which the author has found practicable.

27-254. Properties of Engineering Materials. 2nd Edition. Glenn Murphy. 459 p. 1947. International Textbook Co., Scranton, Pa.

General plan of the text has not been altered appreciably in revision The attempt to give the student a comprehensive and well balanced perspective of the field of engineering materials has been maintained. Data on properties of metals, plastics, and other materials have been brought up to date, and nearly 100 new problems have been added. The portion dealing with metallurgy of ferrous materials has been revised to conform to the latest concepts. Among the many new developments discussed are powder metallurgy, laminated products, cold treatment of metals, high-temperature alloys, silicones, and synthetic rubber.

27-255. Textbook of the Materials of Engineering. 7th Edition. Herbert F. Moore. 500 p. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y.

Designed for use in engineering classes, this book places primary emphasis on the strength, toughness, and stiffness of stress-carrying materials. It discusses the crystalline structure of metals and the structure of wood, concrete, and plastics. New edition covers many new materials of construction developed during the war and methods for processing them. Additional data on plastics, synthetic rubber, and testing machines and methods.

27-256. Cold Shaping of Steel. 126 p. 1947. Heintz Manufacturing Co., Philadelphia 20, Pa.

"Cold shaping" refers to the application of different processes used in Germany, for the heavy plastic deformation of low-carbon steels. The processes include extruding, drawing, coining, and cold forging, all aided by the use of phosphate and other chemical coatings. This report consists mainly of data obtained by a military investigating team, and also a number of free translations of German documents relative to the process.

27-257. Nickel Alloys in Railroad Equipment. 32 p. International Nickel Co., Inc., 67 Wall Street, New York 5, N. Y.

Numerous applications of the above. Recommendations for choice of alloys for specific parts; test data.

27-258. Illustrated Jig-Tooling Dictionary. T. G. Thompson and R. A. Peterson. 349 p. Macmillan Co., 60 Fifth Ave., New York 11, N. Y. $7.50.

Contains over 1000 tooling terms, each illustrated by functional drawings. Besides tooling terms and procedures, such allied subjects as mathematical procedures and formulas, properties and treatment of metals, standards and basic dimensions of plastic-forming processes are included.

27-259. Hot Dip Galvanizing Practice. Second Edition. W. H. Spowers, Jr. 200 p Penton Publishing Co., 1213 W. Third St., Cleveland 13, Ohio. $6.00.

Theory of zinc coating and how to reduce dross losses to a minimum. Modern galvanizing kettles, including the tube-type heated units. Methods of galvanizing various commodities are explained. Other subjects covered include pyrometry in hot galvanizing, control of oxidation, chemical reactions of fluxes, and preparation of flux washes. Thirty-five-page bibliography.

27-260. Symposium on Metallurgy of Steel Welding. 104 p. British Welding Research Association, 29 Park Crescent, London, W.1., England. 10s.

Proceedings consist of the following papers, and accompanying discussion: Constitution of weld metals, by W. Andrews. A preliminary investigation of the constitution of mild-steel arc weld deposits, by H. A. Sloman, T. E. Rooney, and T. H. Schofield. An analytical examination of weld deposits from commercial mild-steel electrodes to specification B.S.S. 639A and the manufacture of artificial weld metal, by G. L. Hopkin. Comments on the role of hydrogen in relation to the cracking of alloy steel on welding, by G. L. Hopkin. The relation between the hydrogen content of weld metal and its oxygen content, by L. Reeve. Influence of sulphur and phosphorus on weldability of mild steel, by L. Reeve. Statement on work of F.M.3 Committee on constitution of weld metal, by G. L. Hopkin. Effect of initial heating temperature on the mechanical properties of an air hardened Ni-Cr-Mo steel, by J. A. Wheeler and V. Kondic. An apparatus for the determination of the viscosity of welding slags, by P. K. Gledhill. Electrophysics of the welding arc, by L. H. Orton. Cracking of welded gas mains, by L. Reeve. A roundtable discussion of weldability testing.

27-261. The Sampling and Assay of the Precious Metals. Second Edition. Er-

nest A. Smith. 505 p. Charles Griffin & Co., Ltd., London, W.C.2, England. 42s.

This book is not greatly different from the 1913 edition with the exception of two chapters dealing with the platinum metals which appear to include all the latest information. Emphasizes practical considerations, including necessity for proper sampling.

27-262. Chemical and Technical Stenography. James Kanegis. 388 p. James Kanegis, P. O. Box 1121, Washington 13, D. C. $5.00.

A text of 435 units for reference, self-study or teaching assignments Designed to help the technical secretary using the Gregg system.

27-263. Résumé of High Temperature Investigations Conducted During 1946-1947. V. 3. 112 p. Timken Roller Bearing Co., Steel and Tube Division, Canton, Ohio. Copies will be sent free to those who can use them to advantage.

The sixth publication of a series running back to 1940. The entire group of publications constitutes a voluminous record of work on C-Mo, Cr-Mo and high Cr-Ni steels unusual in scope. Unique, also, is the fact that the Timken organization, which has sponsored a continuous program of high temperature research at University of Michigan since 1928, is willing to share its results so generously with industry—competitors and customers alike. E.E.T.

27-264. Spectrochemical Abstracts. Ernest H. S. van Someren. Adam Hilger, Ltd., 98 Pancras Way, London, N.W.1, England. $3.50.

Continues work instituted by this leading British optical firm. The 407 citations for 1940-1945 almost exactly equal the number in the two previous volumes (1933-37 and 1938-39). While many of the articles appearing in literature apply to physical and other sciences, the largest subdivision applies to "metals and alloys" (164 abstracts). The abstracts appear to be unusually informative nuggets; the abstractor is to be congratulated.

27-265. Forming of Austenitic Chromium-Nickel Stainless Steels. Vsevolod N. Krivobok and George Sachs. 320 p. The International Nickel Co., Inc., 67 Wall St., New York 5, N. Y. Limited distribution.

Data from American companies are assembled in this comprehensive book. Representative parts, from the simplest dish to the most complex engine manifold, pressed or molded from stainless steel sheet, are described in detail. In nearly every instance a series of drawings shows the blank, the blanking layout, the preformed part and tools, trimming and hold-down allowances, and the finished form and tools (often in perspective). Operations discussed in such detail include not only the conventional pressing, stamping, bending, cupping, and tube flanging, but the action of rubber platens, the "Guerin process", so widespread during the war. Less usual methods of roll forming, draw bench work, and the very difficult flanging of lightening holes in contoured shapes, are illustrated in exhaustive detail. Refreshing is the admission that stainless steel sheet can split, score and otherwise act disconcertingly; methods of avoiding such troubles are given. This book is unique, and will be invaluable to all workers in sheet metal. It is also a magnificent job of illustration and bookmaking. E.E.T.

27-266. Machine Design. Louis J. Bradford and Paul B. Eaton. Fifth Edition. 283 p. John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y. $3.25.

Intended as a textbook. Topics include fundamental definitions, friction and lubrication, bearings and sliding surfaces, friction clutches and brakes, shafts, force and shrink fits, screws, gearing, belts and chains, springs, flywheels, and miscellaneous machine elements.

27-267. Industries Answeright. Charles Z. Smith, Sr. 440 p. Genaflash Co., 105 Grove Ave., Albany, N. Y. $6.00.

Intended for both the experienced mechanic and the student just out of school, this volume includes hundreds of fully illustrated practical problems. Outlines for determining dimensions of standard and special-thread gages. Dimensions for several thousand plug and ring gages. Detail drawings of thread plug gages, thread ring gages, and interlocking and staggered-tooth cutters. A unique slide-rule digit system is explained in detail. Eight-place tables of the natural trigonometric functions and other useful tables.

27-268. Materials Handbook. Sixth Edition. George S. Brady. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. $7.00.

General information, with the most commonly used comparative figures, is given on materials in their group classifications. Patented and trade-named materials are described. Some processed industrial materials have been included for more intelligent judgment of the basic raw materials and because these materials are the raw materials for some industries.

27-269. An Introduction to Crystallography. F. C. Phillips. 302 p. Longmans, Green and Co., 55 Fifth Ave., New York 3. N. Y.

An introductory text for students and also for those physicists and chemists entering upon this field.

Crystal morphology and graphical and numerical procedures used in its study. The 32 crystal classes, parallel growth, and twinning. The study of mathematical relationships assumes only a minimum of mathematical knowledge. Space groups; relationships of crystal habit to the symmetry of the structural pattern.

27-270. Molybdenum in Steel. Climax Molybdenum Co., 500 Fifth Ave., New York, N. Y.

The effects of molybdenum in steel, the mechanical properties of molybdenum steels and applications where these steels may be usefully employed.

27-271. A.S.T.M. Standards on Copper and Copper Alloys. 480 p. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. $4.00.

1947 A.S.T.M. standards of 12 widely used standards covering various nonferrous metals, such as slab zinc, silicon copper, nickel, lead, and others. Methods of tests.

27-272. Shot-Peening. Third Edition. 181 p. American Wheelabrator & Equipment Corp., Mishawaka, Ind. $1.50. Free to executives upon request.

All of the information included in the previous edition plus comprehensive papers on the subject by J. O. Almen of General Motors Research Laboratories and O. J. Horger of Timken Roller Bearing Co. Mr. Horger's article reviews the history of shot-peening and includes a thorough study of all literature on the subject as well as much original work by the author. Mr. Almen's paper discusses the use of snot-peening for improving the fatigue strength of machine parts and also the theory of fatigue failures. H. F. Moore of the University of Illinois discusses in considerable detail the theory of fatigue and how it is affected by shot-peening.

27-273. Methods of Measuring Temperature. Third Edition. Ezer Griffiths. Charles Griffin and Co., Ltd., 42 Drury Lane, London, W.C.2, England.

Adds relatively little to the previous edition, published in 1925. The relevant literature of the past 20 years has been scrutinized and the present text is considered to be a reliable modern survey of a field in which Dr. Griffiths is an acknowledged authority. Emphasis is on precise thermometry rather than on the appliances and approximate methods of industry, although the latter are not wholly neglected.

27-274. Industrial Application of Infrared. James Doyle Hall. 201 p. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y.

Written from a practical point of view, this manual for the executive, supervisor, plant engineer tells how to use infrared radiation to achieve better and more economical surface finishes and how to apply it to other industrial heating jobs. Available equipment, its operating characteristics, and essential design and installation data. Use of infrared heat in such fields as metalworking, wood finishing, textiles, paints, paper, plastics, ceramics, and many others.

27-275. Manual of Aluminum Casting Alloys. 78 p. Aluminum Research Institute, Chicago, Ill.

The results of an extensive experimental investigation of the engineering properties of the aluminum casting alloys, conducted at Case Institute of Technology over a period of several years. Tables of data resulting from statistical analysis of a large number of test results; and photographs showing test procedures, specimens used, and typical microstructures, also concise descriptive material. Several technical papers resulting from the investigation are listed, only one of which has been published to date.

27-276. Light Metals in Structural Engineering. L. Dudley. 216 p. English Universities Press, Ltd., St. Paul's House, Warwick Square, London, E.C.4, England. 30s.

Strength of materials and characteristics of the light metals. Elastic constants, resilience, torsion, bending of beams, deflection and resilience of beams, design of beams and girders, cylindrical tubes or pipes, joints and keys, columns, combined loads and live loads, nature and properties of light metals, and miscellaneous structural materials.

27-277. Annual Statistical Report; American Iron and Steel Institute, 1946. 162 p. 1947. American Iron and Steel Institute, 350 Fifth Ave., New York, N. Y.

27-278. Aircraft Sheet Metal. Rollen H. Drake. 233 p. Macmillan Co., 60 Fifth Ave., New York 11, N. Y.

Important phases of aircraft sheet-metal work. Volume is suitable either as a class text in vocational courses, aviation ground schools, and trade schools, or as a mechanic's handbook. Identification and uses of the metals and alloys commonly used in aircraft fabrication, the theory underlying the fabrication of sheet metal, and the treatment before and after fabrication. Methods of forming and fastening sheet metal.

27-279. Survey of the British Scientific Instrument Industry. 48 p. The Times, 26 Russell Square, London, W.C.2, England.

Thirty-four articles covering the various fields.

27-280. The Chemistry and Metallurgy of Dental Materials. J. Campbell Smith. 317 p. Blackwell Scientific Ltd. Publications, 49 Broad St., Oxford, England. 21s.

The science of dental materials, their composition, properties, uses, and processing technique. Treatment is divided into three sections: dental metals and alloys; inorganic materials other than metals; and organic materials. A short discussion of organic chemistry in its relation to dentistry is appended.

27-281. Electric Furnace Steel Conference, Proceedings. V. 4. 262 p. American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York 18, N. Y.

Papers presented at Pittsburgh Meeting, Dec. 5-7, 1946, as well as accompanying discussion. Topics included are: metallurgy; charging practice; oxidizing-slag heats; stainless-steel production; high-speed-steel production; high-alloy-steel production; importance of slag in acid practice; and sulphur and its elimination. (Individual papers previously annotated.)

ADDRESSES OF PUBLICATIONS

I. English Language Journals

Aero Digest, 515 Madison Ave., New York 22, N. Y.
Aeroplane, Bowling Green Lane, London, E.C.1, England
Aircraft Engineering, 12 Bloomsbury Sq., London, W.C.1, England
Aircraft Production, Stamford St., London, S.E.1, England
Alloy Casting Bulletin, 39 Broadway, New York, N. Y.
Alloy Metals Review, Ditton Rd., Widnes, Lancashire, England
Aluminium and the Non-Ferrous Review, 25 High St., Merton, S.W.19, England
Aluminum and Magnesium, 425 W. 25th St., New York 1, N. Y.
Aluminum Bulletin, 420 Lexington Ave., New York 17, N. Y.
American Ceramic Society, Bulletin, 2525 N. High St., Columbus 2, Ohio
American Ceramic Society, Journal, 2525 N. High St., Columbus 2, Ohio
American Chemical Society, Journal, 1155 16th St., N. W., Washington 6, D. C.
American Electroplaters' Society, Proceedings, Box 168, Jenkintown, Pa.
American Foundryman, 222 W. Adams St., Chicago 6, Ill.
American Foundrymen's Association, Transactions, 222 W. Adams St., Chicago 6, Ill.
American Gas Association Monthly, 420 Lexington Ave., New York 17, N. Y.
American Institute of Mining and Metallurgical Engineers, Transactions, 29 W. 39th St., New York 18, N. Y.
American Iron and Steel Institute, Yearbook, 350 Fifth Ave., New York 1, N. Y.
American Lumberman & Building Products Merchandiser, 139 N. Clark St., Chicago 2, Ill.
American Machinist, 330 W. 42nd St., New York 18, N. Y.
American Mineralogist, Mineralogical Laboratory, University of Michigan, Ann Arbor, Mich.
American Oil Chemists' Society, Journal, 35 E. Wacker Dr., Chicago 1, Ill.
American Paint Journal, 3713 Washington Ave., St. Louis 8, Mo.
American Petroleum Institute, Proceedings, 50 W. Fiftieth St., New York 20, N. Y.
American Pressman, Pressmen's Home, Tenn.
American Railway Engineering Association, Bulletin, 59 E. Van Buren St., Chicago 5, Ill.
American Scientist, O.Z.L. Yale Station, New Haven, Conn.
American Society for Metals, Transactions, 7301 Euclid Ave., Cleveland 3, Ohio
American Society for Testing Materials, Bulletin, *see* ASTM Bulletin
American Society for Testing Materials, Proceedings, 1916 Race St., Philadelphia 3, Pa.
American Society of Mechanical Engineers, Transactions, 29 W. 39th St., New York 18, N. Y.
American Society of Naval Engineers, Journal, Navy Bldg., Constitution Ave., 16th to 17th Streets, N. W., Washington, D. C.
American Society of Tool Engineers, *see* Tool Engineer
American Statistical Association, Journal, 450 Ahnaip St., Menasha, Wis.
American Waterworks Association, Journal, 500 Fifth Ave., New York 18, N. Y.
American Welding Society, *see* Welding Journal
Analyst, Hills Road, Cambridge, England
Analytical Chemistry, 1155 16th St., N. W., Washington 6, D. C.

Applied Scientific Research, Martinus Nijhoff, The Hague, The Netherlands
Architectural Forum, 540 N. Michigan Ave., Chicago 11, Ill.
Association of Official Agricultural Chemists, Journal, Box 540, Benjamin Franklin Station, Washington 4, D. C.
ASTM Bulletin, 1916 Race St., Philadelphia 3, Pa.
Audio Engineering, 28 Renne Ave., Pittsfield, Mass.
Australasian Institute of Mining & Metallurgy, Proceedings, 399 Little Collins St., Melbourne, Victoria, Australia
Automobile Engineer, Dorset House, Stamford St., London, S.E.1, England
Automotive and Aviation Industries (*Changed to* Automotive Industries)
Automotive Industries, Chestnut and 56th St., Philadelphia 39, Pa.
Aviation (*Changed to* Aviation Week)
Aviation News (*Changed to* Aviation Week)
Aviation Week, 99-129 N. Broadway, Albany, N. Y.

Bakelite Review, 30 E. 42nd St., New York 17, N. Y.
Bearing Engineer, Torrington, Conn.
Bell Laboratories Record, 463 West St., New York 14, N. Y.
Bell Telephone Magazine, 195 Broadway, New York 7, N. Y.
Better Enameling, 1427 S. 55th Court, Cicero 50, Ill.
B. H. P. Review, Broken Hill Proprietary Co., Ltd., 265 Franklin St., Melbourne, Australia
Blast Furnace and Steel Plant, 108 Smithfield St., Pittsburgh 30, Pa.
Brick and Clay Record, 59 E. Van Buren St., Chicago 5, Ill.
British Cast Iron Research Association, Bulletin, Alvechurch, Birmingham, England
British Ceramic Society, Transactions, North Staffordshire Technical College, Stoke-on-Trent, England
British Coal Utilization Research Association, Monthly Bulletin, 13 Grosvenor Gardens, London, S.W.1, England
British Steelmaker, Rodney House, Monmouth St., London, W.C.2, England
British Welding Research Association, 29 Park Crescent, London, W.1, England
Brown Boveri Review, Baden, Switzerland
B.S.F.A. Bulletin, British Steel Founders Assoc., 301 Glossop Rd., Sheffield 10, England

Canadian Chemistry and Process Industries, 137 Wellington St., West, Toronto 1, Ont., Canada
Canadian Institute of Mining and Metallurgy, Transactions, 811 Drummond Bldg., Montreal, Que., Canada
Canadian Journal of Research, National Research Council of Canada, Ottawa, Ont., Canada
Canadian Metals & Metallurgical Industries, 137 Wellington St., West, Toronto 1, Ont., Canada
Canadian Mining and Metallurgical Bulletin, 811 Drummond Bldg., Montreal, Que., Canada
Cast Iron Pipe News, Peoples Gas Building, Chicago 3, Ill.
Ceramic Forum, 209 Fourth Ave., Pittsburgh, Pa.
Ceramic Industry, 59 E. Van Buren St., Chicago 5, Ill.
Chemical Age, 154 Fleet St., London, E.C.4, England
Chemical and Engineering News, 1155 16th St., N. W., Washington 6, D. C.
Chemical Engineering, 330 W. 42nd St., New York 18, N. Y.
Chemical Industries, 522 Fifth Ave., New York 19, N. Y.
Chemical, Metallurgical, and Mining Society of South Africa, Journal, P. O. Box 4256, Johannesburg, South Africa
Chemical Reviews, Williams & Wilkins Co., Mt. Royal and Guilford Ave., Baltimore 2, Md.
Chemist Analyst, J. T. Baker Chemical Co., Phillipsburg, N. J.
Clad News, Lukens Steel Co., 348 Lukens Bldg., Coatesville, Pa.
Coal Age, 330 W. 42nd St., New York 18, N. Y.
Coal Technology, 29 W. 39th St., New York 18, N. Y.
Coke and Gas, 33 Tothill St., Westminster, London, S.W.1, England
Combustion, 200 Madison Ave., New York 16, N. Y.
Communications, 52 Vanderbilt Ave., New York 17, N. Y.

Compressed Air Magazine, Phillipsburg, N. J.
Copper and Brass Bulletin, 420 Lexington Ave., New York 17, N. Y.
Corrosion, 905 Southern Standard Bldg., Houston 2, Texas
Corrosion and Material Protection, 1131 Wolfendale St., Pittsburgh, Pa.
Colliery Guardian, 30 & 31 Furnival St., Holburn, London, E.C.4, England

Deco Trefoil, Denver Equipment Co., P. O. Box 5268, Denver 17, Colo.
Department of State Bulletin, Washington 25, D. C.
Die Castings, 1240 Ontario St., Cleveland 13, Ohio
Domestic Commerce, U. S. Government Printing Office, Washington 25, D. C.
Drilling, 1420 Pacific Ave., Dallas, Texas
Drilling Contractor, 1408-10 Gulf States Bldg., Dallas 1, Texas
Drop Forging Topics, 605 Hanna Bldg., Cleveland 15, Ohio

Economic Geology, N. Queen St. and McGovern Ave., Lancaster, Pa.
Edgar Allen News, Edgar Allen & Co., Ltd., Sheffield 9, England
Edison Electric Institute Bulletin, 56th & Chestnut St., Philadelphia, Pa.
Editor & Publisher, Suite 1700 Times Tower, 1475 Broadway, New York 18, N. Y.
Electric Light & Power, 360 North Michigan Ave., Chicago, Ill.
Electrical Engineering, 33 W. 39th St., New York 18, N. Y.
Electrochemical Society, Transactions, 3000 Broadway, New York 27, N. Y.
Electrodepositors' Technical Society, Journal, 27 High St., Islington, London, England
Electronic Engineering, 28 Essex St., Strand, W.C.2, England
Electronic Industries & Electronic Instrumentation, 480 Lexington Ave., New York 17, N. Y.
Electronics, 330 W. 42nd Street, New York 18, N. Y.
Electroplating, 83 Udney Park Rd., Teddington, Middlesex, England
Electrotypers & Stereotypers Journal, 329 High Holborn, London, W.C.1, England
Enamelist, 4150 E. 56th St., Cleveland 5, Ohio
Endeavour, Mobel House, Buckingham Gate, London, S.W.1, England
Engineer, 28 Essex St., Strand, London, W.C.2, England
Engineering, 35-36 Bedford St., Strand, London, W.C.2, England
Engineering and Mining Journal, 330 W. 42nd St., New York 18, N. Y.
Engineering Experiment Station News, *see* Ohio State University, Engineering Experiment Station News
Engineering Materials and Processes, 38 Hatton Gardens, London, E.C.1, England
Engineering News-Record, 330 W. 42nd St., New York 18, N. Y.
Engineers' Digest (American Edition), 1 Madison Ave., New York 10, N. Y.

Factory Management and Maintenance, 330 W. 42nd St., New York 18, N. Y.
Faraday Society, Transactions, 98 Great Russell St., London, England
Farm Quarterly, 22 E. 12th St., Cincinnati, Ohio
Fasteners, 1550 Hanna Bldg., Cleveland 15, Ohio
Federal Science Progress, U. S. Government Printing Office, Washington 25, D. C.
Finish, 360 N. Michigan Ave., Chicago 1, Ill.
Flow, 812 Huron Bldg., Cleveland 15, Ohio
Food Industries, 330 W. 42nd St., New York 18, N. Y.
Foote Prints, 500 Germantown Trust Co. Bldg., Philadelphia, Pa.
Fortune, 160 Maple St., Jersey City, N. J.
Foundry, Penton Bldg., Cleveland 13, Ohio
Foundry Trade Journal, 49 Wellington St., Strand, London, W.C.2, England
Franklin Institute, Journal, Parkway at 20th St., Philadelphia, Pa.
Frontier, Armour Research Foundation, Technology Center, Chicago 16, Ill.
Fuel in Science and Practice, 3 Thorny Court, Palace Gate, London, England

Gas Age, 56th & Chestnut St., Philadelphia 39, Pa.
Gas Journal, 11 Bolt Court, Fleet St., London, E.C.4, England
Gas Times, 29 Grove Rd., Leighton Buzzard, Beds, England
General Electric Review, Schenectady 5, N. Y.
Glass Industry, 55 W. 42nd St., New York 18, N. Y.
Glass Packer, 55 W. 42nd St., New York 18, N. Y.

Heating and Ventilating, 148 Lafayette St., New York 13, N. Y.
Heating, Piping & Air Conditioning, 6 N. Michigan Ave., Chicago 2, Ill.

Illinois Tech Engineer, Illinois Institute of Technology, 3300 Federal St., Chicago, Ill.
Inco, International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Inco Magazine, International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Index, New York Trust Co., 100 Broadway, New York, N. Y.
India-Rubber Journal, Stafford House, Norfolk St., London, W.C.2, England
Industrial and Engineering Chemistry (Industrial Edition and Analytical Edition), 1155 16th St., N. W., Washington 6, D. C.
Industrial Chemist, 33 Tothill St., Westminster, London, S.W.1, England
Industrial Diamond Review, 37 S. Wabash Ave., Chicago, Ill.
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Industrial Radiography & Non-Destructive Testing, 53 W. Jackson Blvd., Chicago 4, Ill.
Industry and Power, St. Joseph, Mich.
Industry and Welding, 1240 Ontario St., Cleveland 13, Ohio
Institute of British Foundrymen, Proceedings, St. John St. Chambers, Deansgate. Manchester 3, England
Institute of Fuel, Journal, 18 Devonshire St., London, W.1, England
Institute of Metals, Journal, 4 Grosvenor Gardens, London, S.W.1, England
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Institute of Radio Engineering, Proceedings, 1 E. 79th St., New York 21, N. Y.
Institute of Welding, Transactions, 2 Buckingham Palace Gardens, London, S.W.1, England.
Institute Spokesman, National Lubricating Grease Institute, 4638 Milcreek Parkway, Kansas City 2, Mo.
Institution of Automobile Engineers, Journal, 12 Hobart Place, London, S.W.1, England
Institution of Engineers & Shipbuilders in Scotland, Transactions, Elmbank Crescent, Glasgow, Scotland
Institution of Mechanical Engineers, Journal, Storey's Gate, St. James Park, London, S.W.1, England
Institution of Mechanical Engineers, Proceedings, Storey's Gate, St. James Park, London, S.W.1, England
Institution of the Rubber Industry, Transactions, 12 Whitehall, London, S.W.1, England
Institution of Mining and Metallurgy, Bulletin, Salisbury House, Finsbury Circus, London, E.C.2, England
Instrumentation, Wayne and Roberts Ave., Philadelphia 44, Pa.
IRI Transactions, *see* Institution of the Rubber Industry, Transactions
Iron Age, 100 E. 42nd St., New York 17, N. Y.
Iron and Steel, Dorset House, Stamford St., London, S.E.1, England
Iron and Steel Engineer, Empire Bldg., Pittsburgh 22, Pa.
Iron and Steel Institute, Journal, 4 Grosvenor Gardens, London, S.W.1, England

Journal of Agricultural Research, U. S. Government Printing Office, Washington 25, D. C.
Journal of Applied Mechanics, 29 W. 39th St., New York 18, N. Y.
Journal of Applied Physics, 57 E. 55th St., New York 22, N. Y.
Journal of Chemical Education, 20th & Northampton St., Easton, Pa.
Journal of Colloid Science, 125 E. 23rd St., New York 10, N. Y.
Journal of Physical and Colloid Chemistry, Williams & Wilkins Co., Mt. Royal and Guilford Ave., Baltimore 2, Md.
Journal of Physics (U.S.S.R.), Moscow, U.S.S.R.
Journal of Research of the National Bureau of Standards, U. S. Government Printing Office, Washington 25, D. C.
Journal of Scientific Instruments, 47 Belgrave Sq., London, S.W.1, England
Journal of the Aeronautical Sciences, 2 E. 64th St., New York 21, N. Y.

Light Metal Age, 201 North Wells St., Chicago 6, Ill.
Light Metals, Bowling Green Lane, London, E.C.1, England

Light Metals Review, Salisbury House, London Wall, E.C.2, England
Linde Tips, Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y.
Link-Belt News, Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.
Locomotive Magazine and Railway Carriage and Wagon Review, 88 Horseferry Rd., Westminster, S.W.1, England
Lubrication Engineering, 343 S. Dearborn St., Chicago 4, Ill.

Machine Design, Penton Bldg., Cleveland 13, Ohio
Machine and Tool Blue Book, 542 S. Dearborn St., Chicago 5, Ill.
Machinery (American), 148 Lafayette St., New York 13, N. Y.
Machinery (London), National House, West St., Brighton 1, England
Machinery Lloyd (Overseas Edition), 6 Cavendish Place, Regent St., London, W.1, England
Magnesium, Brooks & Perkins, Inc., 2457 Woodward Ave., Detroit 1, Mich.
Magnesium Review and Abstracts, Magnesium Elektron Ltd., Abbey House, London, N.W.1, England
Mainspring, Associated Spring Corp., Bristol, Conn.
Materials & Methods, 330 W. 42nd St., New York 18, N. Y.
Mechanical Engineering, 29 W. 39th St., New York 18, N. Y.
Mechanization, Munsey Bldg., Washington 4, D. C.
Metal Finishing, 11 W. 42nd St., New York 18, N. Y.
Metal Industry, Dorset House, Stamford St., London, S.E.1, England
Metal Progress, 7301 Euclid Ave., Cleveland 3, Ohio
Metal Treatment, 49 Wellington St., Strand, London, W.C.2, England
Metallurgia, 31 King St., West, Manchester 3, England
Metals, 425 W. 25th St., New York 1, N. Y.
Metals Review, 7301 Euclid Ave., Cleveland 3, Ohio
Metals Technology, 29 W. 39th St., New York 18, N. Y.
Metco News, Metallizing Engineering Co., Inc., Long Island City, N. Y.
Microtecnic, 23 Avenue de la Gare, Lausanne, Switzerland
Midwest Power Conference, Proceedings, 3300 Federal St., Chicago 16, Ill.
Mine & Quarry Engineering, 23 Great Queen St., London, W.C.2, England
Mineral Industries, Pennsylvania State College, State College, Pa.
Mines Magazine, 734 Cooper Bldg., Denver 2, Colo.
Mining and Metallurgy, 29 W. 39th St., New York 18, N. Y.
Mining Congress Journal, 1102 Ring Bldg., Washington 6, D. C.
Mining Magazine, Salisbury House, London, E.C.2, England
Mining Technology, 29 W. 39th St., New York 18, N. Y.
Mining World, 121 2nd St., San Francisco 5, Calif.
Modern Industrial Press, Windsor Manor, P. O. Box 687, Pittsburgh 30, Pa.
Modern Industry, 347 Madison Ave., New York 17, N. Y.
Modern Lithography, 254 W. 31st St., New York 1, N. Y.
Modern Machine Shop, 431 Main St., Cincinnati 2, Ohio
Modern Metals, Burnham Bldg., Chicago 1, Ill.
Monthly Review, 5800 N. Mervine St., Philadelphia, Pa.

National Bureau of Standards, Journal of Research, *see* Journal of Research of the National Bureau of Standards
National Bureau of Standards, Technical News Bulletin, U. S. Government Printing Office, Washington 25, D. C.
National Electronics Conference, Proceedings, Northwestern University, Evanston, Ill.
National Lithographer, 11 Park Place, New York 7, N. Y.
Nature, St. Martin's St., London, W.C.2, England
Nickel Cast Iron News, International Nickel Co., Inc., 67 Wall St., New York 5, N. Y.
Nucleonics, 330 W. 42nd St., New York 18, N. Y.

Official Digest, 704 Weightman Bldg., 1524 Chestnut St., Philadelphia, Pa.
Ohio State University, Engineering Experiment Station News, Columbus, Ohio
Oil and Colour Chemists Association, Journal, J. Hannaford, F. C. A., Aldwych House, Aldwych, W.C.2, England
Oil and Gas Journal, 211 S. Cheyenne Ave., Tulsa 1, Okla.
Oilways, 15 W. 51st St., New York 19, N. Y.

Optical Society of America, Journal, 57 E. 55th St., New York 22, N. Y.
Organic Finishing, 11 W. 42nd St., New York 18, N. Y.

Pacific Plastics, 124 W. 4th St., Los Angeles 13, Calif.
Paint and Varnish Production Manager, Mills Bldg., Washington 6, D. C.
Paint Manufacture, Leonard Hill, Ltd., 17 Stratford Place, London, England
Paint, Oil and Chemical Review, 537 S. Dearborn St., Chicago 5, Ill.
Paint Technology, 5 Grange Court, Pinner, Middlesex, England
Paper Making and Paper Selling, 24 Bride Lane, Fleet St., London, E.C.4, England
Paper Mill News, 1309 Noble St., Philadelphia 23, Pa.
Paper Trade Journal, 15 W. 47th St., New York 19, N. Y.
Petroleum, Leonard Hill, Ltd., 17 Stratford Place, London, W.1, England
Petroleum Engineer, Irwin-Kaesler Bldg., Dallas 1, Texas
Petroleum Processing, 1213 W. 3rd St., Cleveland 13, Ohio
Petroleum Refiner, Gulf Publishing Co., 3301 Buffalo Dr., Houston, Texas
Philips Technical Review, 215 4th Ave., New York 3, N. Y.
Philosophical Magazine, Taylor and Francis Ltd., Red Lion Court, Fleet St., London, England
Photo-Engravers' Bulletin, 166 W. Van Buren St., Chicago 4, Ill.
Physical Review, 57 E. 55th St., New York 22, N. Y.
Physical Society, Proceedings, 1 Lowther Gardens, Prince Consort Rd., London, S.W.7, England
Pit and Quarry, 538 S. Clark St., Chicago 5, Ill.
Plastics (American), 185 N. Wabash Ave., Chicago 1, Ill.
Popular Mechanics Magazine, 200 E. Ontario St., Chicago 11, Ill.
Powder Metallurgy Bulletin, 320 Yonkers Ave., Yonkers 2, N. Y.
Power, 99-129 Broadway, Albany 1, N. Y.
Power Plant Engineering, 53 W. Jackson Blvd., Chicago 4, Ill.
Proceedings of the I.R.E., *see* Institute of Radio Engineers, Proceedings
Producers Monthly, 69 Main St., Bradford, Pa.
Product Engineering, 330 W. 42nd St., New York 18, N. Y.
Production and Engineering Bulletin, St. James Sq., London, S.W.1, England
Production Engineering & Management, 2842 West Grand Blvd., Detroit 2, Mich.
Products Finishing, 431 Main St., Cincinnati 2, Ohio
Progressive Architecture, 330 W. 42nd St., New York 18, N. Y.
Pure Oil News, 35 E. Wacker Dr., Chicago 1, Ill.

Radio-Electronic Engineering, 185 N. Wabash Ave., Chicago 1, Ill.
Radio News, 185 N. Wabash Ave., Chicago 1, Ill.
Railway Age, 30 Church St., New York 7, N. Y.
Railway Engineering and Maintenance, 105 W. Adams St., Chicago 3, Ill.
Railway Mechanical Engineer, 30 Church St., New York 7, N. Y.
Refractories Journal, Rodney House, 6 Monmouth St., London, W.C.2, England
Refrigeration Industry, 1240 Ontario St., Cleveland 13, Ohio
Refrigerating Engineering, 40 W. 40th St., New York 18, N. Y.
Reports of the Progress of Applied Chemistry, 56 Victoria St., London, S.W.1, England
Review of Scientific Instruments, 57 E. 55th St., New York 22, N. Y.
Reviews of Modern Physics, 57 E. 55th St., New York 22, N. Y.
Reynolds Metals Technical Advisor, 2500 S. 3rd St., Louisville 1, Ky.
Rohm & Haas Reporter, Washington Square, Philadelphia 5, Pa.
Royal Society, Proceedings, Bentley House, N.W.1, London, England
Rubber Age, 250 W. 57th St., New York 19, N. Y.
Russian Technical Research News, 58 Park Ave., New York 16, N. Y.

SAE Journal, 29 W. 39th St., New York 18, N. Y.
SAE Quarterly Transactions, 29 W. 39th St., New York 18, N. Y.
Science, 1515 Massachusetts Ave., N.W., Washington 5, D. C.
Science Illustrated, 330 W. 42nd St., New York 18, N. Y.
Scientific American, 24 W. 40th St., New York 18, N. Y.
Scientific Monthly, 1515 Massachusetts Ave., N. W., Washington 5, D. C.
Screw Machine Engineering, 45 Exchange St., Rochester 4, N. Y.
Sheet Metal Industries, 49 Wellington St., London, W.C.2, England
Sheet Metal Worker, 1309 Noble St., Philadelphia 23, Pa.

Shipyard Bulletin, Newport News Shipbuilding and Dry Dock Co., Newport News, Va.
Skillings' Mining Review, 501 Builders Exchange, Duluth 2, Minn.
Soap and Sanitary Chemicals, 254 W. 31st St., New York, N. Y.
Society for Experimental Stress Analysis, Proceedings, Addison-Wesley Press, Inc., Cambridge 42, Mass.
Society of Automotive Engineers, Journal, *see* SAE Journal *and* SAE Quarterly Transactions
Society of Chemical Industry, Journal, 56 Victoria St., London, S.W.1, England
Society of Glass Technology, Journal, Northumberland Rd., Sheffield 10, England
Society of Instrumental Technology, Transactions, 55 Tudor Gardens, London, W.3, England
Steel, Penton Bldg., Cleveland 13, Ohio
Steel Construction Digest, 101 Park Ave., New York 17, N. Y.
Steel Processing, 108 Smithfield St., Pittsburgh 30, Pa.
Steel Horizons, Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Steelways, 350 Fifth Ave., New York 1, N. Y.
Storage Battery Power, Thomas A. Edison, Inc., West Orange, N. J.
Stove Builder, Shoreham Hotel, Washington 8, D. C.

Technology Review, 10 Ferry St., Concord, N. H.
Testing Topics, Baldwin Locomotive Works, Philadelphia 42, Pa.
Tool & Die Journal, 1975 Lee Rd., Cleveland 18, Ohio
Tool Engineer, 550 W. Lafayette Blvd., Detroit 26, Mich.

United Effort, United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.
Vancoram Review, 420 Lexington Ave., New York 17, N. Y.
Walworth Today, 60 E. 42nd St., New York 17, N. Y.
Water and Sewage Works, 22 W. Maple St., Chicago 10, Ill.
Weld, 850 Folsom St., San Francisco 7, Calif.
Welder, Murex Welding Processes, Ltd., Waltham Cross, Herts, England
Welding, Dorset House, Stamford St., London, S.E.1, England
Welding Engineer, 330 W. 42nd St., New York 18, N. Y.
Welding Journal, 33 W. 39th St., New York 18, N. Y.
West of Scotland Iron and Steel Institute, Journal, 93 Hope St., Glasgow, Scotland
Western Machinery and Steel World, 500 Sansome St., San Francisco, Calif.
Western Metals, 1709 W. 8th St., Los Angeles 14, Calif.
Western Miner, 505 Metropolitan Bldg., Vancouver, B. C., Canada
Wire and Wire Products, 300 Main St., Stamford, Conn.
Wire Industry, 33 Furnival St., London, E.C.4, England

II. Foreign Language Journals

Most of the foreign journals are available through Stechert-Hafner, Inc., 31 E. 10th St., New York 3, N. Y. The Russian journals are also available through Four Continent Book Corp., 253 Fifth Ave., New York 16, N. Y.

Avtogennoe Delo (Welding), Moscow, U.S.S.R.
Academy of Sciences of the U.S.S.R., Bulletin (Section of Chemical Sciences), Moscow
Academy of Sciences of the U.S.S.R., Bulletin (Section of Technical Sciences), Moscow
Academy of Sciences of the U.S.S.R., Reports, Moscow
Aluminio, Instituto Sperimentale dei Metalli Leggeri, Via della Posta 8/10, Milano, Italy
Analytica Chimica Acta, Elsevier Publishing Co., Inc., 215 4th Ave., New York, N. Y.

Boiler and Turbine Construction (U.S.S.R.), Leningrad
Boletin da Associacao Brasiliera de Metais, Instituto de Pesquisas Technologicas, Praca Cel. Fernando Prestes, 110; Caixa Postal: 141-A; Sao Paulo, Brazil
Bulletin de la Société Chimique de France, 28 Rue Saint-Dominique, Paris 7, France

Chimia, Rascher-Verlag, Zurich, Switzerland

Collection of Czechoslovak Chemical Communications, Prague, Czechoslovakia. (U. S. and Canadian agent: International Arts & Science Book Co., 192 Broadway, New York, N. Y.)
Comptes Rendus (France), Quai des Grands Augustins 55, Paris, France
Comptes Rendus de l'Academie des Sciences de l'U.R.S.S., Wolkhouka 14, Moscow, U.S.S.R.

Factory Laboratory (U.S.S.R.), Department of Ferrous Metallurgy of the U.S.S.R., Moscow
Fonderie, 46 Victor Hugo Ave., Paris 16, France

Helvetica Chimica Acta, Swiss Chemical Society, Basil, Switzerland
Hutnicke Listy, Mucednicka 8, Brno-Zabovresky, Czechoslovakia

Industrial Power (U.S.S.R.), *see* Promyshlennaia Energetika

Jernkontorets Annaler, Kungsträdgardsgatan 6, Stockholm C, Sweden
Journal of Analytical Chemistry (U.S.S.R.), Academy of Sciences of the U.S.S.R., Moscow
Journal of Applied Chemistry (U.S.S.R.), Academy of Sciences of the U.S.S.R., Moscow and Leningrad
Journal of General Chemistry (U.S.S.R.), Academy of Sciences of the U.S.S.R., Moscow and Leningrad
Journal of Technical Physics (U.S.S.R.), Academy of Sciences of the U.S.S.R., Moscow and Leningrad
Journal of Experimental and Theoretical Physics (U.S.S.R.), Academy of Sciences of the U.S.S.R., Moscow and Leningrad

Kislorod (Oxygen), Government Bureau for the Oxygen Industry, Moscow, U.S.S.R.

Le Vide Technique Applications, Société Francaise des Ingénieurs Techniciens du Vide, 44 Rue de Rennes, Paris 6, France

Metalen, Drukkerij-Uitgeverij "De Hofstad", Scheepmakersstraat, 'S-Gravenhage, Netherlands
Metallforschung, Dr. Riederer-Verlag, Paulinenstrasse 37b, Stuttgart W, Germany
Métaux et Corrosion, 32 Rue du Marechal-Joffre, St.-Germain-en-Laye (Seine-et-Oise), France
Mitteilungen des Chemischen Forschungsinstituts der Industrie Österreichs, Neumarkt 10, Vienna 3, Austria

Oxygen, *see* Kislorod

Promyshlennaia Energetika (Industrial Power), Moscow, U.S.S.R.

Revue de l'Aluminium, 77 Boulevard Malesherbes, Paris 8, France
Revue de Metallurgie, 5 Cité Pigalle, Paris 9, France
Royal Institute of Technology, Transactions, Stockholm, Sweden

Schweizer Archiv, Buchdruckerei Vogt-Schild A. G., Solothurn, Switzerland
Schweizer Chemiker-Zeitung, Rascher-Verlag, Zurich, Switzerland
Soudure et Technique Connexes, Publications de la Soudure Autogene, 39 Rue d'Amsterdam, Paris 8, France
Smit Medelingen, Willem Smit & Co.'s, Transformatorenfabriek N. V. Nijmegen, Netherlands
Stahl und Eisen, Stahleisen m.b.H., 1 August-Thyssen-Str., Düsseldorf, Germany
Société Francaise de Metallurgie, Bulletin, *see* Revue de Metallurgie

Welding, *see* Avtogennoe Delo

AUTHOR INDEX

Authors' names are indexed by section number and item number rather than by page. The numerals preceding the hyphen refer to the section number; the numerals following the hyphen refer to the number of the literature listing.

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SUBJECT INDEX

The 27 classifications of the Review of Metal Literature are primarily classifications by *process,* and therefore in preparing this index, the major emphasis has been placed on *materials*. It is hoped that sufficient cross-references have been included to guide the user who is seeking *all* material on a subject which is not a sectional division. Under subject headings which are also sectional headings (such as **Corrosion, Welding, Electroplating**) only a general reference has been made to other entries, on the assumption that a user desiring all material would turn first to the appropriate section in the book rather than to the subject index.

Alloy systems are indexed in the order of the constituent whose initial letter comes first in the alphabet, i.e., **Aluminum-gold, Copper-nickel, Tin-zinc,** with no regard to percentage composition. Indexing is by section number and item number rather than by page. The numerals preceding the hyphen refer to the section number; the numerals following the hyphen refer to the number of the literature listing.

MEREDITH SMITH WRIGHT

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